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OF THE

AMERICAN OSTEOPATHIC ASSOCIATION

ANESTHESIOLOGY NUMBER

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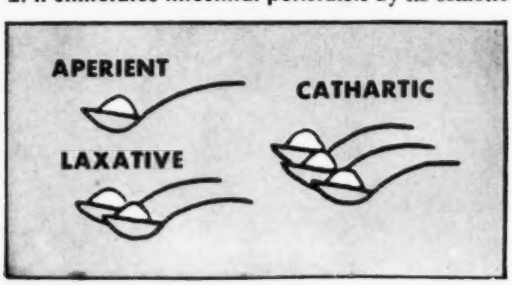

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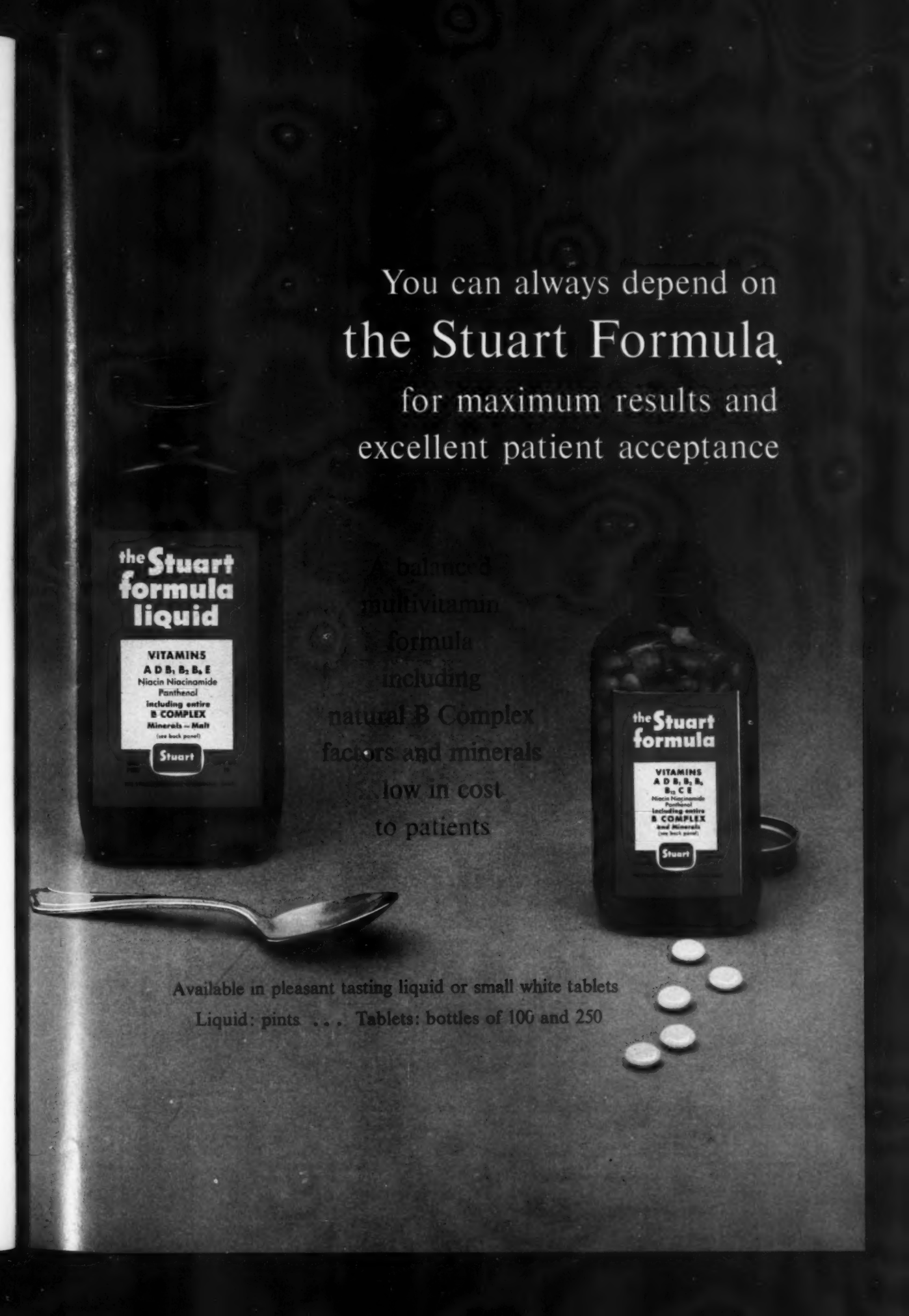
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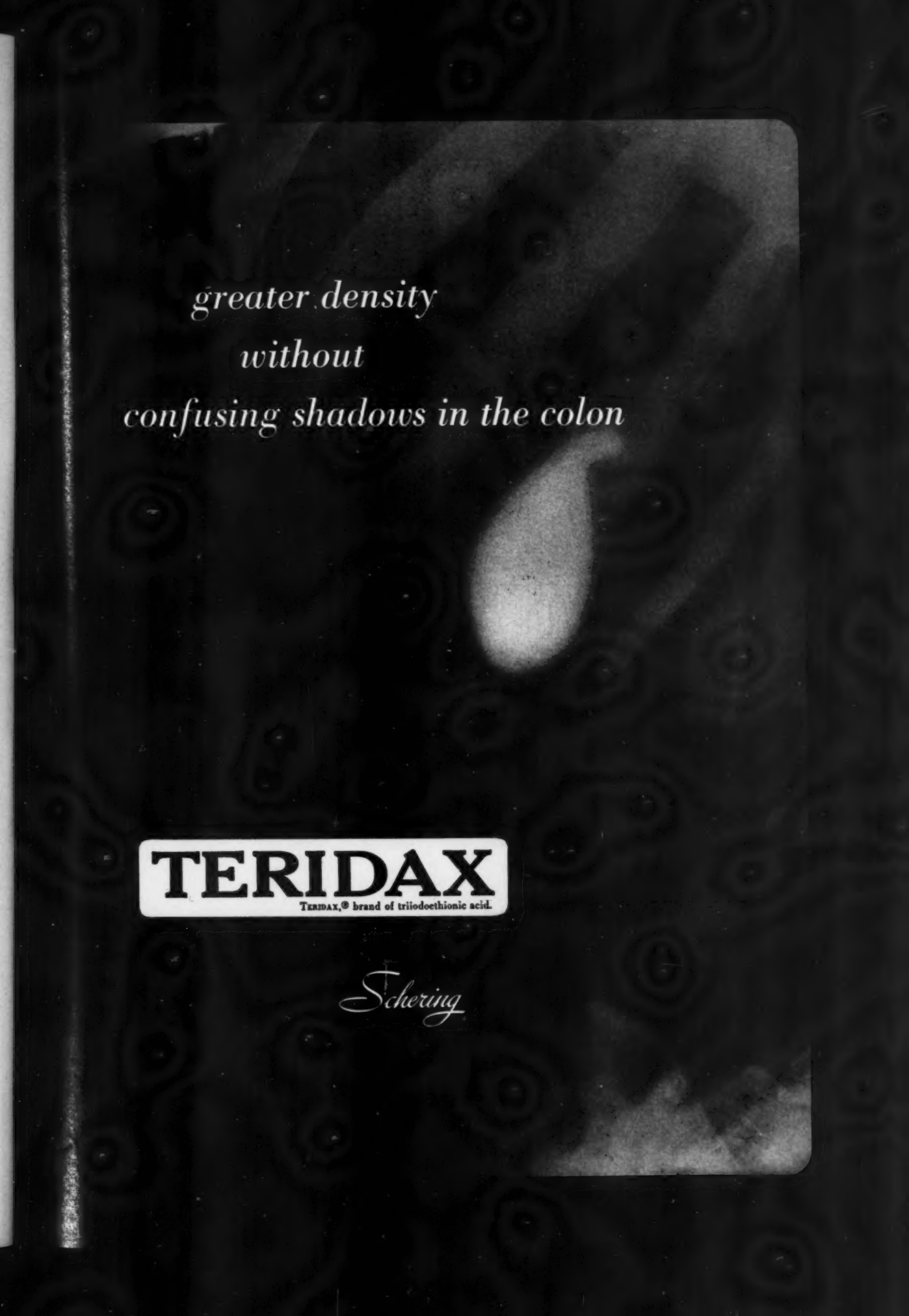
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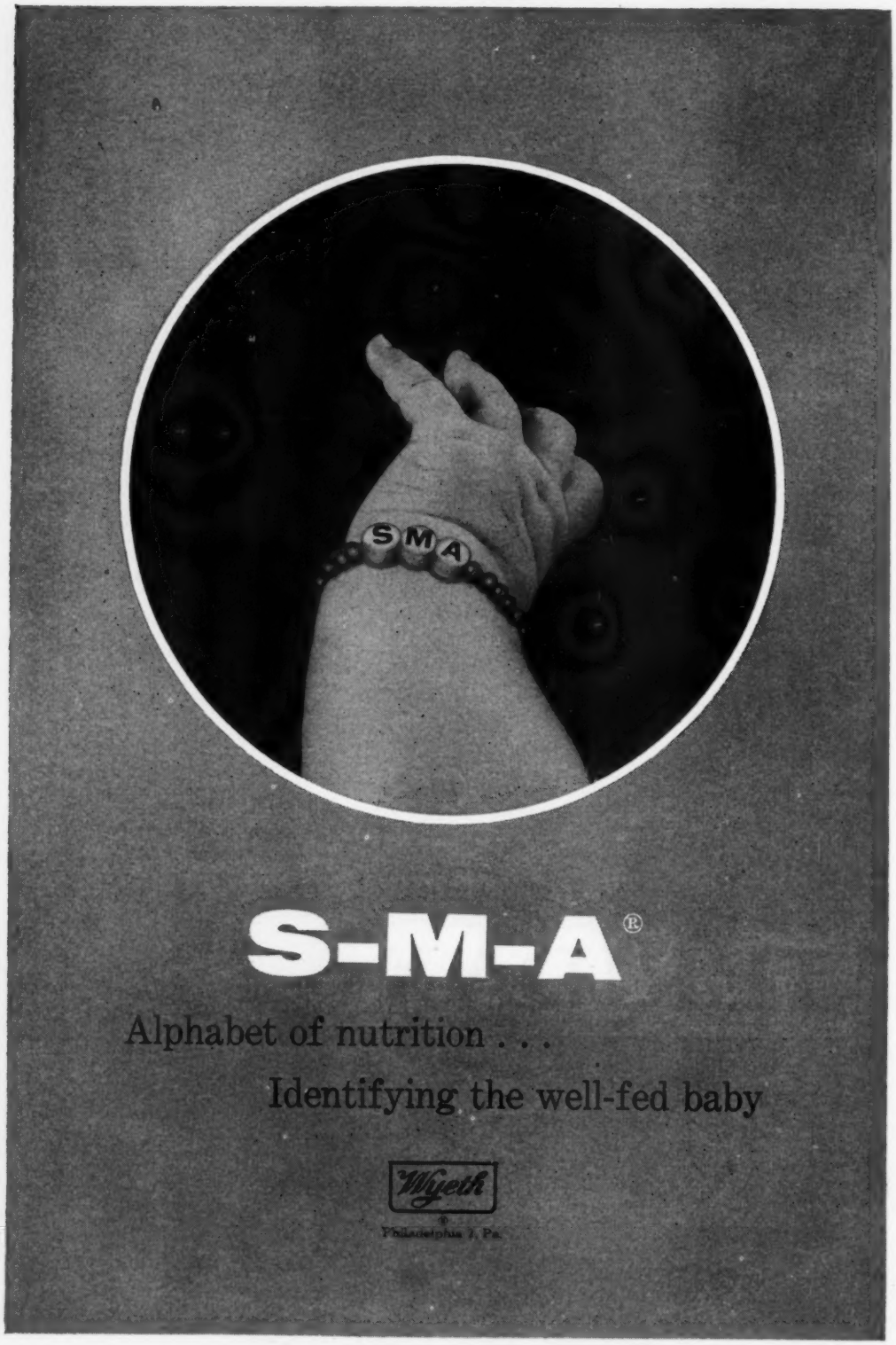
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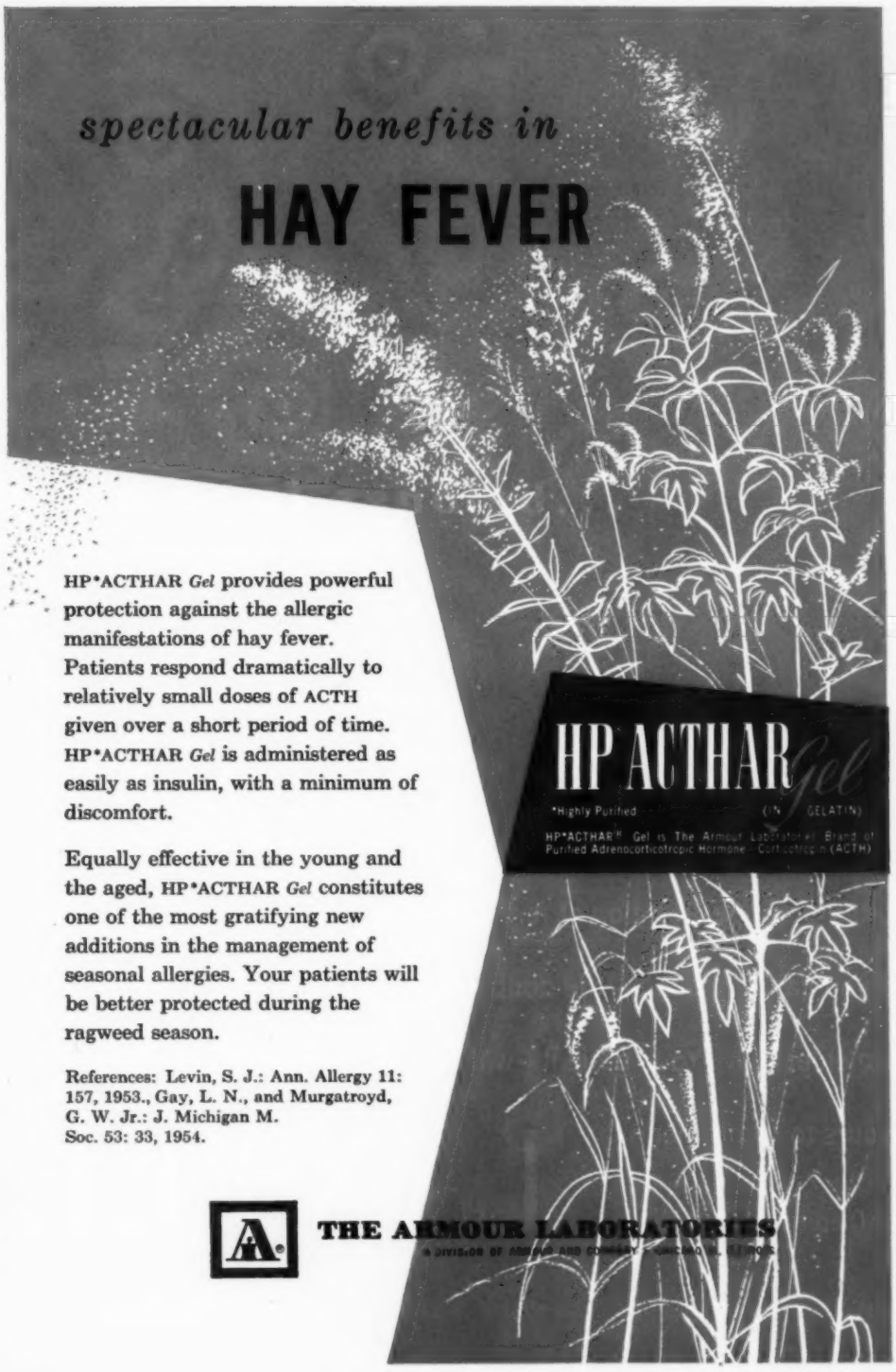
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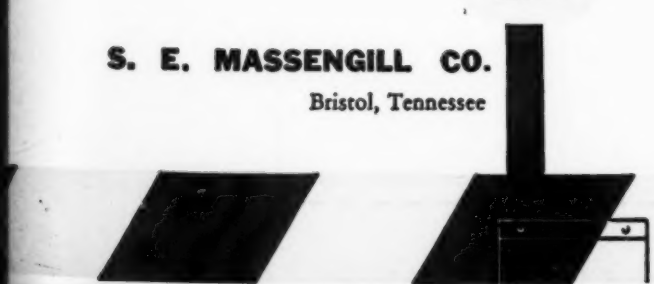

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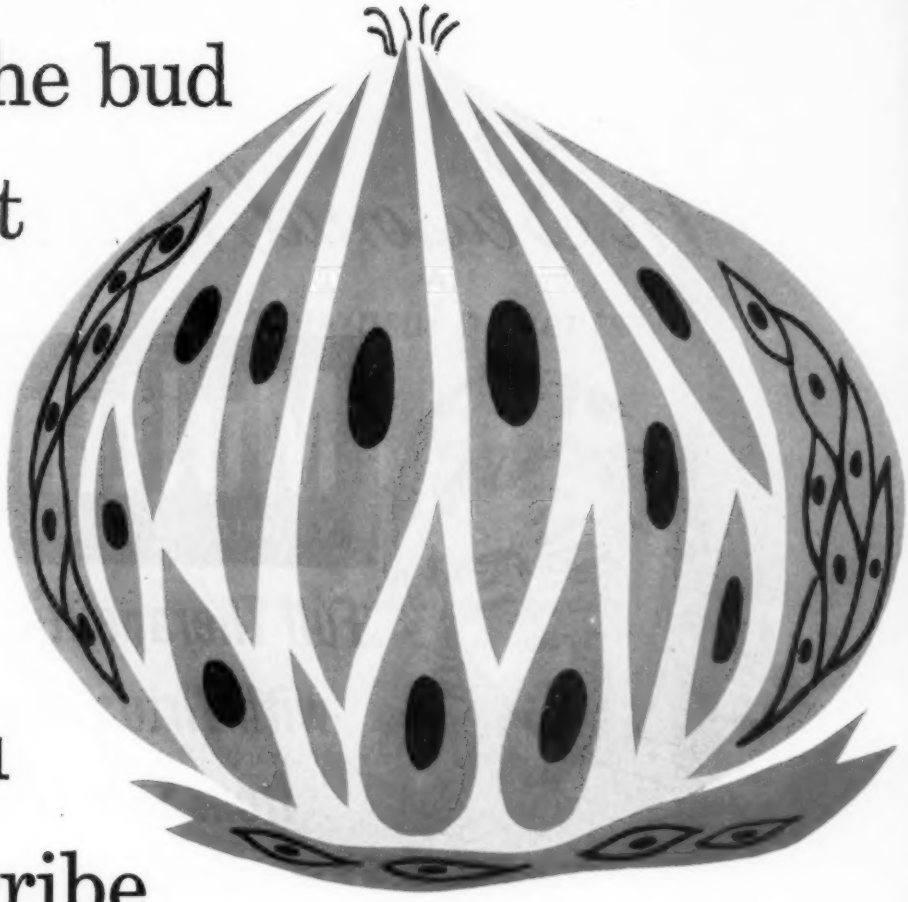

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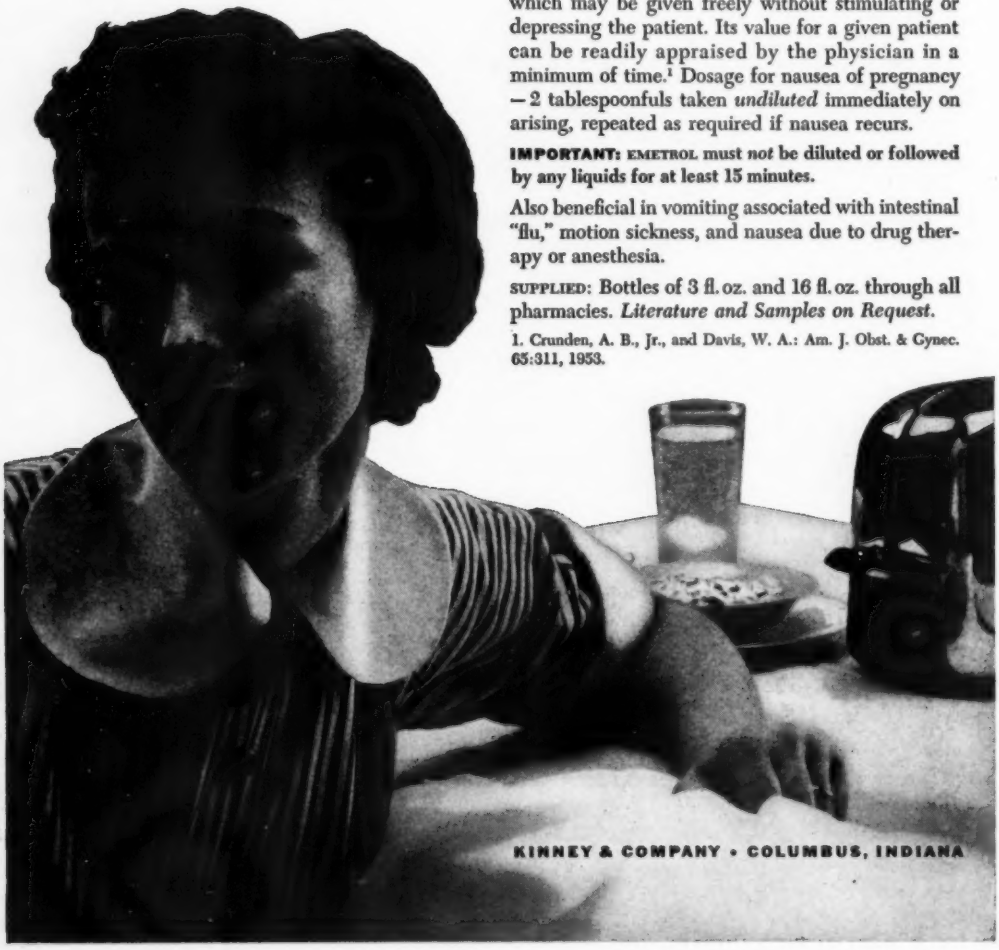

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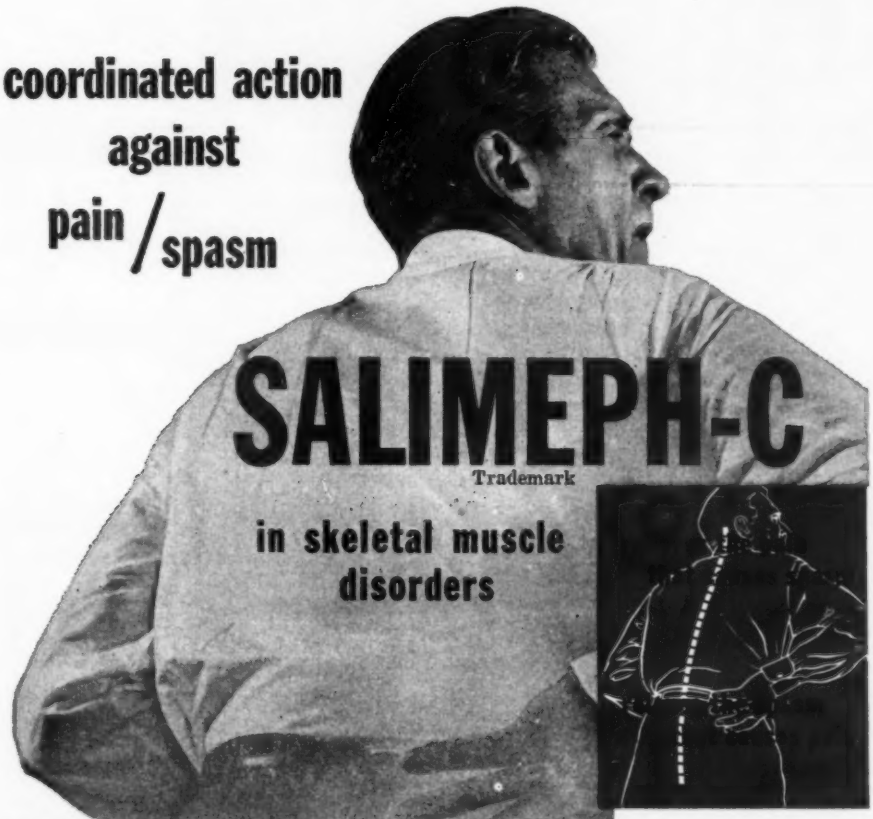

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RAUWILOID®

TWO TABLETS AT BEDTIME

the original alkaloidal extract (alseroxylon fraction) of Rauwolfia serpentina (Benth.) . . .

demonstrated clinically and experimentally to possess the entire desirable properties of the whole root,[1] but freed from its inert dross . . .

mildly hypotensive . . . moderately bradycrotic . . . sedative (nonsoporific) . . . tranquilizing . . .

virtually free from side actions . . . no ganglionic or adrenergic blockade . . . no postural hypotension . . .

notably simpler in dosage regimen than whole root preparations or isolated alkaloids—usual dosage, 2 tablets (2 mg. each) at bedtime.

1. Gourzis, J. T.; Sonnenschein, R. R., and Barden, R.: Alterations in Cardiovascular Responses of the Dog Following Rauwiloid, An Alkaloidal Extract of Rauwolfia serpentina, Proc. Soc. Exper. Biol. & Med. *85*:463 (Mar.) 1954.

for Mild, Labile Hypertension

RAUWILOID® + VERILOID®

ONE TABLET T. I. D., P. C.

combines—in one tablet—the gradual, stabilizing, prolonged hypotensive influence of Rauwiloid (1 mg.) with

the potent, rapid action of Veriloid (3 mg.) . . .

resulting in rapid drop of tension and prompt relief of symptoms . . .

overcoming tachycardia and apprehension . . .

giving patient a new, tranquil outlook, enabling him to cope better with life and work.

Advantages—Only one medication to take—no confusing dosage instructions—dosage required is usually well tolerated, effective in notably higher percentage of patients—central action, no ganglionic or adrenergic blockade, no postural hypotension—side actions to Veriloid greatly reduced—contraindications only those to Veriloid.

Simplified dosage regimen: Initially, 1 tablet t.i.d., after meals; after two weeks (for Rauwiloid effect) increase if needed. Maintenance, 1 to 2 tablets t.i.d. to q.i.d., (average, 1 tablet q.i.d.) not less than 4 hours apart.

Grades II and III

Serpiloid (reserpine, Riker), a chemically pure crystalline alkaloid of Rauwolfia serpentina, is one of the active agents of Rauwiloid, possessing a measure of the hypotensive, bradycrotic and tranquilizing actions of Rauwiloid. May be employed when crystalline drug therapy is desired. Dosage somewhat more critical than Rauwiloid; initially, 1 tablet (0.25 mg.) t.i.d. or q.i.d.

SERPILOID®

Reserpine, Riker

That Flows through Your Office

RAUWILOID + HEXAMETHONIUM

INITIALLY ½ TABLET Q.I.D.

lessens the risk when ganglionic blockade is justified by severity or failure to respond to other medications . . .

synergistic effect of Rauwiloid lessens dosage of hexamethonium needed for full effect . . . reduces it up to 50 per cent . . .

stabilizes effect of hexamethonium . . .

lessens severity of postural hypotension and incidence and severity of side actions due to hexamethonium . . .

produces prompt symptomatic relief . . . overcomes headache, tachycardia, and apprehension . . . produces a sense of tranquil well-being . . .

makes hexamethonium therapy less fraught with danger . . . hence more widely applicable . . .

simplifies management and dosage adjustment.

Contraindications and cautions only those to hexamethonium.

Each tablet contains 1 mg. Rauwiloid and 250 mg. hexamethonium. Initial dosage, ½ tablet q.i.d., before meals and at bedtime; after two weeks (for Rauwiloid effect) increase by small increments, not oftener than twice a week, until desired effect is obtained.

Grades III and IV

PARENTERAL VERILOID

The main indications for Solution Intravenous Veriloid* and Solution Intramuscular Veriloid* are the emergency cases that do not respond to other therapy, such as

- Hypertensive crises (encephalopathy)
- Hypertensive states accompanying cerebral vascular disease or kidney disease
- Malignant hypertension
- Hypertensive toxemia of pregnancy.

Solution Intramuscular Veriloid is used either as supplementary therapy to Solution Intravenous Veriloid, to maintain the hypotension induced by the original infusion, or as initial therapy.

Complete instructions for administration and dosage of Solution Intravenous Veriloid and Solution Intramuscular Veriloid accompany each ampul. *N.N.R.

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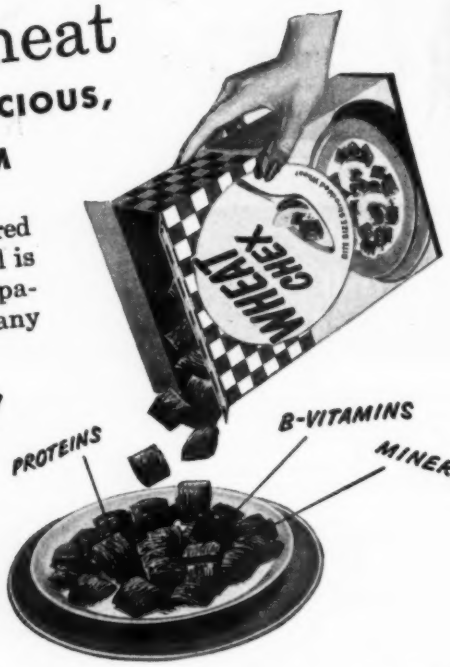

WHEAT CHEX is made of whole wheat, ready to eat without fixing.

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the newest dosage form of the

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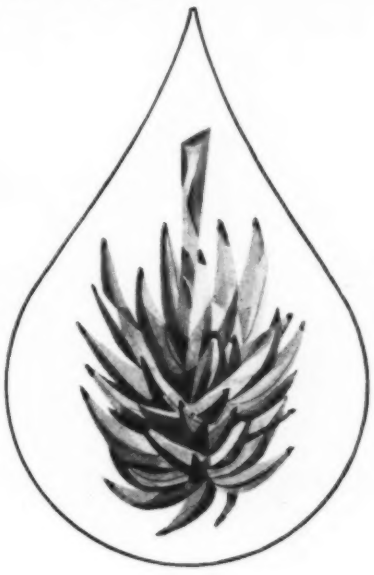

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brand of tetracycline

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Now infants and young children can receive the basic benefits of TETRACYN with the basic ease of pediatric drop administration. TETRACYN is well tolerated in all its dosage forms.

"Clinically, tetracycline was tried on 25 infants and children (ages 6 weeks to 8 years) with a variety of microbial infections, including pneumonia, upper respiratory infections, conjunctivitis, gastroenteritis, diarrhea, and gangrenous appendicitis. Twenty-three of them were definitely improved with restoration of normal temperature in one to three days."*

SUPPLIED: Tetracyn Pediatric Drops *(banana flavored)* 1.0 Gm. in 10 cc. bottle, 100 mg. tetracycline (amphoteric) per cc., with special dropper calibrated at 25 mg. and 50 mg.

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Tetracyn Intravenous *(hydrochloride)* Vials of 250 mg. and 500 mg.

Tetracyn Ointment *(hydrochloride) (topical)* 30 mg./gram, in ½ oz. and 1 oz. tubes

Tetracyn Ophthalmic Ointment *(hydrochloride)* 5 mg./gram, in ⅛ oz. tubes

*Lawler, E. G. et al.: Clin. Med. 61:207 (March) 1954.

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As a supplementary aid to supply needed minerals to the dietary, Vitaminerals introduces a unique formulation—VM. No. 23, a poly-mineral liquid suspension. This new, palatable method of administering needed minerals is especially appealing to mineral starved geriatrics and children who sometimes present a problem when asked to take tablets.

VM. No. 23 contains not only the four more familiar minerals—calcium, phosphorus, iodine and iron—but an additional seven of the more important elements. This new formula in its pleasing and palatable liquid form may provide in many of your cases among geriatrics and children a practical answer to the problem of modern mineral deficient food.

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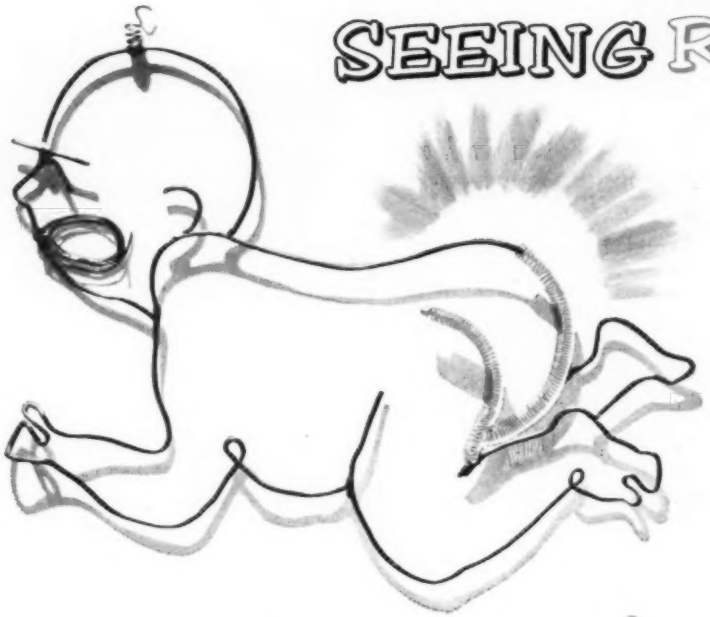

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BREMIL *minimizes* the possibility of digestive upsets

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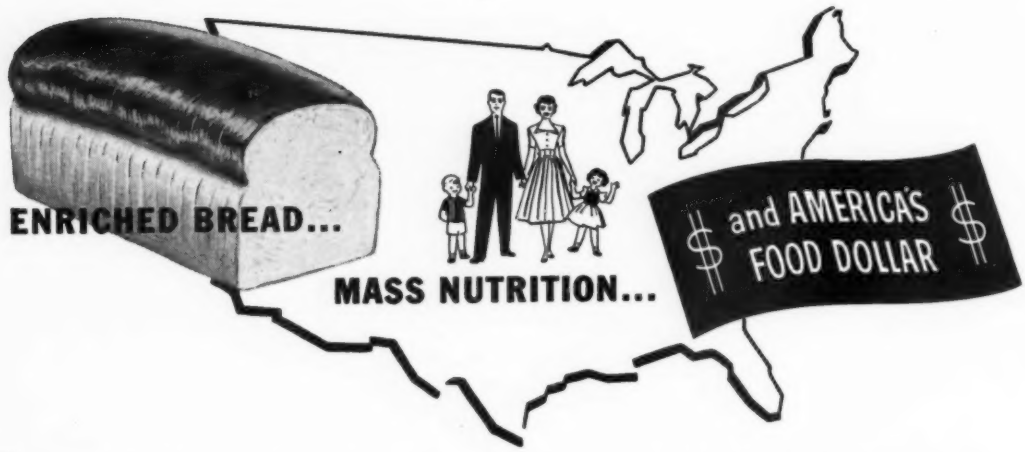
***Standard Dilution:* 1 level tablespoonful BREMIL and 2 fluidounces cooled boiled water**

***Supplied:* In 1-lb. tins, through all drug channels**

References: 1. Goldstein, L. S.: Clin. Med. 59:455, 1952. 2. Pratt, A. G.: A.M.A. Am. J. Dis. Child. 82:429, 1951.

for samples and literature, write to:

Borden's® **PRESCRIPTION PRODUCTS DIVISION** 350 Madison Avenue, New York 17



THE nationwide average retail price of 5½ ounces of enriched bread (the estimated average daily consumption) is approximately 5.8 cents.[3] This small fraction of America's food dollar has been responsible for notable gains in mass nutrition and health.[2] The National Research Council and the American Medical Association's Council on Foods and Nutrition have recently reaffirmed their endorsement of the enrichment of bread in the light of "good evidence that enriched bread has been beneficial to the public."[1]

Column I of the appended table shows the amounts of nutrients and nutrient energy provided by 5½ ounces of enriched bread. Column II of the table gives the percentages of the recommended daily dietary allowance[4] available from this amount of enriched bread.

It is evident that enriched bread furnishes substantially more than its share of most nutrients. Thus it compensates for deficiencies of these nutrients in other foods of the everyday diet. Since virtually all enriched bread is made with nonfat milk solids, its protein—containing an average of 10.5 per cent milk protein and 89.5 per cent wheat and yeast proteins[5]—functions for growth as well as tissue maintenance.

Enriched bread might well be considered a basic food in maintaining the high nutritional status of the American people, yet it can be purchased for so small a percentage of the American food dollar.

CONTRIBUTION OF 5½ OUNCES OF ENRICHED BREAD

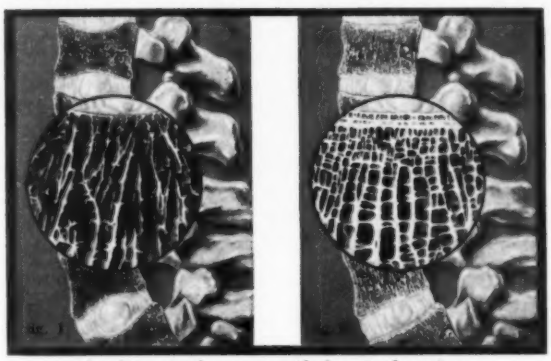
	Nutrients and Calories	Percentages of Allowances (1953)[4]
Protein	13.2 Gm.	20%
Thiamine	0.37 mg.	26%
Niacin	3.4 mg.	24%
Riboflavin	0.23 mg.	14%
Iron	4.1 mg.	34%
Calcium (average)	137 mg.	17%
Calories	418	14%

1. Council on Foods and Nutrition, American Medical Association: A Statement of General Policy Concerning the Addition of Specific Nutrients to Foods, J.A.M.A. *154*:145 (Jan. 9) 1954.
2. Sebrell, W.H.: Trends and Needs in Nutrition, J.A.M.A. *152*:42 (May 2) 1953.
3. Bureau of Labor Statistics, United States Department of Labor, Jan., 1954.
4. Shank, R.E.: Revisions of the Recommended Dietary Allowances, J. Am. Dietet. A. *30*:105 (Feb.) 1954.
5. Sherman, H.C.: Chemistry of Food and Nutrition, ed. 8, New York, The Macmillan Co., 1952, pp. 212, 599.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

AMERICAN BAKERS ASSOCIATION
20 NORTH WACKER DRIVE • CHICAGO 6, ILLINOIS

AGING CHANGES THE BONE PICTURE



lumbar vertebrae, magnified sagittal sections

The vital role that estrogen and androgen play in the preparation and recalcification of bone matrix readily explains why declining sex hormone production which accompanies aging is most frequently the cause of osteoporosis. Note typical atrophic changes characteristic of postmenopausal osteoporosis (fig. 1) in contrast to normal bone matrix (fig. 2). Reifenstein* is of the opinion that some degree of osteoporosis is almost "physiologic" after the menopause, and that clinical osteoporosis may be found in about 10 per cent of women over 50 years of age.

With combined estrogen-androgen therapy, "pain in the spine and other bones is relieved considerably or completely in a matter of weeks to months," and with extended periods of treatment, the prognosis for bone recalcification is good.*

Combining both estrogen and androgen, "Premarin" with Methyltestosterone provides a dual approach for maximum efficiency in treating osteoporosis. A brochure outlining full details of therapy is available at your request.

*Reifenstein, E. C., Jr., in Harrison, T. R.: Principles of Internal Medicine, Philadelphia, The Blakiston Company, 1950, p. 655.

"Premarin" with Methyltestosterone is supplied in two potencies: the *yellow* tablet (No. 879) contains 1.25 mg. of conjugated estrogens equine and 10 mg. of methyltestosterone; the *red* tablet (No. 878) contains 0.625 mg. and 5 mg. respectively. Both potencies are available in bottles of 100 and 1,000 tablets.

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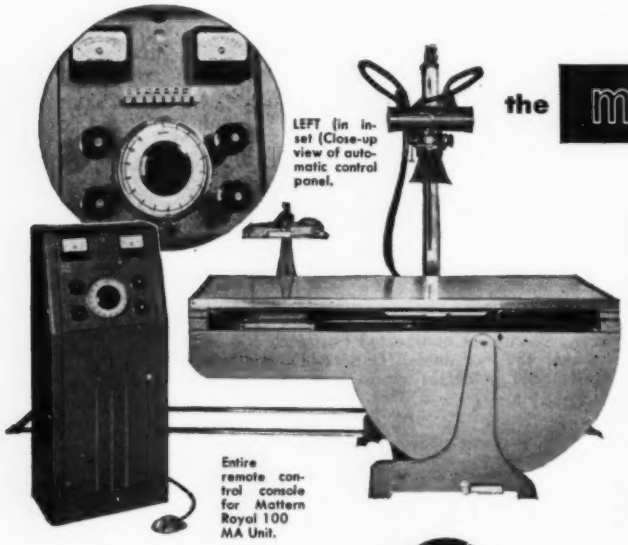

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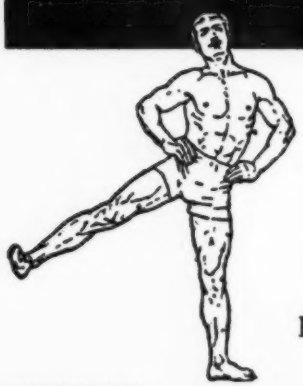

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For rheumatic cases with associated g.i. disturbance

Each tablet contains:
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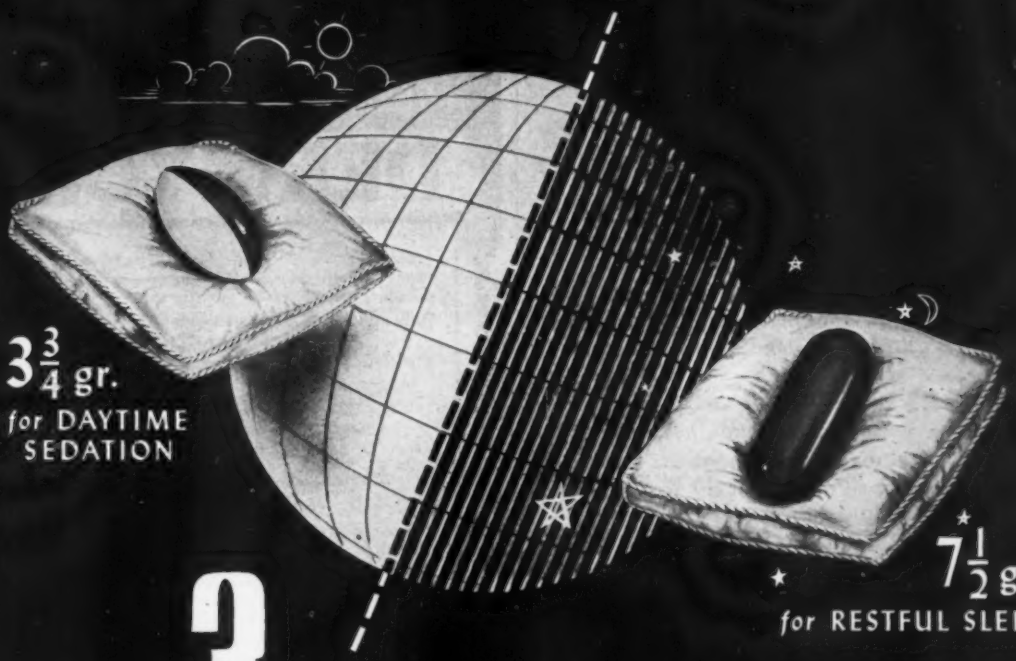

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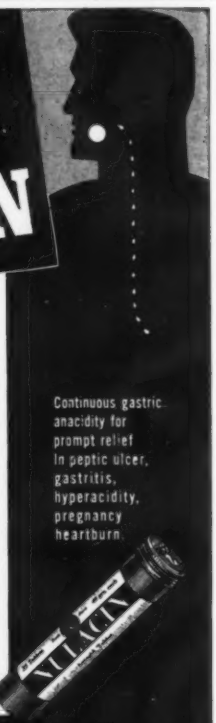
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*Steigmann, F., and Goldberg, E., J. Lab. & Clin. Med. 42:955 (1953).

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The Manipulative Approach to Shoulder Problems*

OMAR C. LATIMER, B.Sc., D.O.
New Milford, Conn.

The problems attending the consideration of manipulative therapy in shoulder disability can well be compared with those that face the driver of an automobile as he approaches one of the multiple cloverleaves of today's superhighways. At first he sees only a maze of turning and twisting roads, tunnels, and bridges. They seem to lead everywhere at once, and his problem is to be quick enough to catch the signpost pointing out the road he must follow to reach his destination. If he misses the first signpost, he may well waste a great deal of gasoline, time, and patience in getting back onto the right road.

Shoulder disability may be due to so many and varied causes that, if we fail to make at least a reasonably accurate diagnosis, we may find ourselves traveling on one of the by-roads to therapeutic success rather than on the direct route.

Diagnosis of shoulder disability is often a difficult problem. It is not too difficult to put a name to each of these disabilities, but it may be difficult to put the right names to them. A review of some of the more authoritative texts reveals some very interesting differences of opinion on many of the great variety of shoulder disabilities. Suffice it to say that any conscientious physician has sufficient ammunition in his library to confuse himself thoroughly if he permits the opinions of others to cloud his ability to think osteopathically.

The great majority of shoulder disabilities are accompanied by pain or, if not by actual pain, at least by discomfort. The pain or discomfort may be little or great and may be due to any one or more of fifty-odd separate causes. French[1] lists forty-nine causes of shoulder pain and to these can be added the various pathologic conditions in soft and bony tissues recognizable only by the osteopathically trained physician.

Whereas pain is the most universal symptom of shoulder disability, the patient may complain also of muscle stiffness, restriction of motion, reduced power, and a variety of sensory changes which may be deep or superficial or both. Pain usually stimulates the patient to search for relief.

In my opinion shoulder pain, and indeed shoulder disability, is at least as often due to causes apart in location from the shoulder as to pathology within or approximate to the shoulder per se. Thus when a patient presents himself to his physician complaining of shoulder pain (and/or other symptoms of shoulder disability), it would seem to behoove the physician to determine to the best of his ability not only where the pain is but where it comes from. The latter may not be too easy, but in this determination lies the secret of successful treatment. Especially is this true when the pain is not confined to, centered in, or immediately proximate to the articular components of the shoulder. Generally speaking, pain centered in or around the joint itself is usually, though not always, due to pathology in or around the joint, and pain which involves tissues above or below the joint is usually, though again not always, due to pathology elsewhere. The same is basically true of the other symptoms of which the patient may complain. Here then is the first clue to etiology and the first signpost on the highway to effective treatment.

The term "reasonably accurate diagnosis" is deserving of some definition. It would not be well to assume that a good guess is a worthy substitute for a reasonably accurate diagnosis. By that I mean that treating disabled shoulders with a better than average degree of success necessitates first determining what the nature of the disability is: Is it painful? Is it stiff? Is there limited motion and, if so, to what degree and in what directions? Are there other points of complaint proximal to or distal to the shoulder itself and, if so, where, and what is their nature? What is the intensity of all of these? How long have they existed, individually and collectively? How did they start and in what sequence? Is the patient more comfortable by day or by night? What position does he assume for greatest relief?

Second, it must be determined what, if any, complaint the patient may have pertaining to his gastrointestinal, cardiac, and respiratory systems, since certain affections of these systems may refer pain to the shoulder or its vicinity. Among these are gallstones and cholecystitis; duodenal lesions; pancreatic lesions, such as chronic pancreatitis, pancreatic cyst, carcinoma,

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and pancreatic stone; pleurisy; pneumonia; new growth of almost any portion of the thorax; angina pectoris; coronary disease; aortic disease; subdiaphragmatic disease, such as peritonitis secondary to peptic ulcer, abscess of the liver, and so forth. Also systemic infections such as syphilis, tuberculosis, and arthritis; metabolic diseases as gout, rickets, and scurvy; dystrophies such as Paget's disease and hemophilia; and certain of the endocrine dyscrasias will cause shoulder pain and/or disability Add to these possibilities pain in the shoulder from lead and radium poisoning, rib and vertebral fractures and dislocations, neoplastic or infectious disease of adjacent structures, scoliosis, cervical rib, anomalies of various sorts, hemiplegia, herpes zoster, and a host of others, and the possible complexity of diagnosis can be appreciated.

The above are only some of the possible causes of shoulder disability of one sort or another, and what is undoubtedly the most important single group of causes has as yet hardly been touched upon. As osteopathic physicians, we have a very distinct advantage in the management of shoulder disability, for it is our privilege by education and training to be able to detect the presence of the osteopathic lesion, particularly the spinal lesion, and to include it in this most important single group of causes. This is the traumatic group, from which we take some license in excluding fractures of the shoulder and its immediate neighboring structures for the reason that these are surgical problems not within the scope of this paper.

Traumatic causes of shoulder disability include simple or gross, acute or chronic sprain or strain of the shoulder and/or its associated tissues; subluxation or dislocation of the glenohumeral, acromioclavicular, or sternoclavicular articulation or the elbow; occupational stresses and strains; exposure to cold and damp or to drafts; surgery to the shoulder itself or to any of the bony, muscular, ligamentous, or fascial structures attached thereto; structural disequilibrium as from short leg, pelvic imbalance, polio, and the like, and last, but by far most important, the osteopathic lesion.

Any physician who has treated disabled shoulders for more than a few years could add considerably to the above causes for this very common complaint. The list is not complete, but it is complete enough to emphasize the fact that even a reasonably accurate diagnosis cannot be reached without consideration of many possible etiologic factors. The diagnostic deck of cards is stacked in favor of the osteopathically trained physician, if he would but realize that fact and reason osteopathically.

Fortunately the usual case of shoulder disability will respond to well thought-out and skillfully applied treatment, even though we may not know specifically what its cause may be. Judging from my own experience, a lame shoulder is seldom encountered with symptoms which indicate a bursitis, for instance, and nothing else, or a slipped biceps tendon and nothing else, or a subluxation of the acromioclavicular joint and nothing else. Often soft tissue changes about the shoulder may be misleading, not only in diagnosis but in treatment as well. Minor distortions of the joint secondary to structural imbalance, as from short leg, scoliosis, and poor postural habit may produce such alterations in joint function as to set up local periarticular soft tissue reactions which again may be misleading. Again this is not a complete listing of such possibilities.

The point to remember is that most shoulder disabilities are complex in nature, which means that, almost regardless of etiologic genesis, a certain amount of myositis, fasciitis, neuritis, or neuralgia exists in neighboring soft tissues.

I stated previously that the osteopathic lesion is the most important of all traumatic causes of shoulder disability. I cannot remember ever examining a disabled shoulder and its associated parts without finding osteopathic bony lesion pathology either as its cause or as a result of the disability. Such pathology may exist in any articulation of the upper extremity. It may exist in any of the spinal or rib articulations and in the articulations of the pelvis. And it may exist in any of the articulations of the lower extremities, including the feet. In other words practically any part of the skeletal structure may be involved.

Chronic skeletal lesions are more apt to be etiologic of shoulder disability than are acute ones. Chronic lesions of such nature as to produce a chronic distortion of skeletal equilibrium, such as chronic sacroiliac strain, may affect the shoulder as well as other joints of the body above the site of the lesion, by originating an imbalance of muscular, ligamentous, and fascial forces resulting in chronic joint strain and eventual joint pathology. Acute sacroiliac strain, using this lesion again as an example, while usually producing a greater imbalance, is not so prone to produce the same end result because the effect is usually of too short duration to allow for the same pathologic organization.

There should be no difficulty in envisioning possible similar effects from chronic skeletal distortions resulting from short leg from whatever cause, poliomyelitic deformity, hemiplegia, asymmetric diplegia, deforming weight-bearing joint disease, such as arthritis, osteochondrosis, tuberculosis, or Paget's disease, and any of a number of other deformity-producing states. All of these may, by variously shifting the equilibrium of the pelvis and the spine above it, alter the guy-roping efficiency of the muscles and ligaments whose function it is to maintain the body in an easy upright position. The possibilities are almost limitless.

Lesions of the spine, which produce distortion above or below their site, more usually above, may have the same effect. Again, the chronic lesion is the more likely culprit, although the closer the lesion to the source of nerve and blood supply to the shoulder and its adjacent parts, the more likely it is for subacute and acute lesions to produce shoulder pathology. This is especially true of lesions, including the osteopathic spinal lesion, between the occiput and the sixth or seventh dorsal segment. Osteopathic lesions in this area of the spine may cause shoulder disability, may be secondary to that disability, or may be a primary factor in maintaining the chronicity of the disability. Whereas lesions anywhere above the sixth or seventh dorsal level may affect the shoulder, in my experience the most frequent offenders are lesions of the first and second dorsal, fourth and fifth cervical, occiput, atlas, and sixth dorsal in that order. Some may disagree with this observation as they may with a growing conviction on my part that, as a rule, the higher the lesion the higher its effect in relation to the shoulder. Lesions of the occiput and the atlas seem to cause symptoms,

usually pain and stiffness, between the point of the shoulder and the suboccipital tissues. Lesions between the third cervical and third dorsal segments seem to manifest their effects in and around the shoulder itself while lesions below the third dorsal seem to affect structures distal to the shoulder. This is no hard and fast rule for there is certainly overlapping both as to site of lesion and distribution of effect, but it has been my general observation.

Lesions above the third dorsal level are more apt to produce neuralgic or neuritic symptoms and the lower the lesion, the longer the train of effect. By that I mean that lesions of the upper three cervical segments do not seem to be so often productive of symptoms below the level of the insertion of the deltoid muscle as do lesions between the fourth cervical and the third dorsal segments. Also lesions below the fifth dorsal, if they affect the upper extremity, are more likely to have their effects below the deltoid insertion than above it. I have been unable to understand just how, anatomically and neurologically speaking, some of these effects come about, but they do occur and are important in the management of shoulder complaints.

Another observation of note is that these lesions occur individually. Most cases in my experience have manifested lesion pathology in two or more levels of the cervicodorsal spine at the same time, and it is not always simple to arrive at an early decision as to which of the lesions is more at fault. In normalizing these lesions, what was suspected of being the primary lesion, at least as to effect, has turned out to be a secondary lesion, again as to effect. Fortunately, if the physician does his total job well, which is primary and which is secondary is of not too great import. If both are conscientiously normalized, the end result is quite uniformly good.

Much more could be said on the subject of the osteopathic spinal lesion and its association with shoulder disability, but it is unnecessary, here, to go into the anatomy, physiology, neurology, and pathology of the osteopathic lesion in these instances.

First in management comes examination of the case. From the patient's description of his complaint, it can probably be decided whether his is an acute, subacute, or chronic state. He will probably tell where and when his shoulder hurts most and what he can or cannot do with it. From this information the part or parts of the shoulder involved can be identified and, from the osteopathic standpoint, the parts of the spine involved may also be suspected. If the shoulder has suffered obvious trauma then diagnosis may depend entirely upon just what the injury is conceived to have been although, even in such a case, the possibility should not be discarded that some skeletal or systemic abnormality has been a predisposing factor and has rendered the shoulder more susceptible to injury than it would be in the absence of such abnormality.

Physical examination of the offending part, made with the above possibilities in mind, should disclose the probable cause for the majority of shoulder complaints. X-ray study should be employed when indicated, but the findings therefrom should not necessarily be believed. Visual evidence of fracture or dislocation cannot, of course, be denied and must be credited as being the etiologic factor in the disability present or certainly contributing greatly to it. Visual evidence of bursitis is, on the other hand, no proof that the bursitis is the major cause for the disability of which the patient complains. In my opinion, bursitis is much more often a symptom than an entity and, except when apparently caused by specific trauma, is most often due to osteopathic lesion pathology, usually of the segments between the fourth cervical and second dorsal vertebrae, or to foci of infection. Certainly bursitis responds to thorough, normalizing, soft tissue and articular manipulation of the structures of the cervicodorsal spine and shoulder mass. Adjunctive measures such as immobilization between treatments, heat, or sometimes cold, and x-ray therapy may prove helpful but cannot replace judiciously applied manipulative treatment. Injection and excision, which seem to me to be symptomatic treatment and not directed to the removal of the cause, fall in the same category. Every osteopathic physician has seen cases of shoulder pain and disability in which x-ray has shown a calcified bursa, which when treated by manipulation alone has responded to the point of complete eradication of the complaint, but in which post-treatment x-ray study showed the calcified bursa still evident. To me, those cases prove that the cause is apart from the bursa and that they should not be diagnosed as bursitis but as bursitis secondary to something else. The "something else," to me, appears most often to be osteopathic lesion pathology somewhere in the cervical or upper dorsal spine. Treatment should be directed to the cause.

What is true of bursitis, which I have used only as an example, is also true, I think, of the majority of shoulder complaints, with the exception of some of the frankly traumatic injuries. Seldom is only one of the many muscular, ligamentous, fascial, or bony parts involved, especially if the complaint has existed for more than a few hours. Muscles contract and lose their elasticity, ligaments thicken and shorten, fascial tension may be altered, inflammation is very often present, adhesions may form, there is often joint distortion, and instead of a theoretically simple slip of the biceps tendon, for instance, a generally disabled shoulder girdle results.

Manipulative procedures in shoulder problems must be applied with due respect for the state of the shoulder and with specific direction as to what is expected to be accomplished by their use. The acutely lame shoulder must be handled differently from the chronically lame one. The painful shoulder which has been subjected to trauma must be handled differently from the one which has been disabled by arthritis, or which is secondary to cerebral accident, or which is due to structural imbalance, or surgery as in radical mastectomy. Each is a problem in itself. The objectives of manipulative treatment might be summarized as follows:

1. To relieve the patient, as rapidly as possible, of the discomfort which he suffers.

2. To restore as near perfect function as is possible.

3. To eliminate, insofar as possible, the mechanics of recurrence.

Relief of discomfort can be accomplished in many ways. Clinical judgment based upon experience will prompt the use of immobilization, thermotherapy of one type or another, counterirritants, x-ray, local anesthesia, and the like, depending upon the severity of the discomfort and the tolerance of the patient to manipu-

lation. Clinical judgment must also determine the type of manipulation to be applied, as well as its intensity and frequency. In the acutely lame, sore shoulder, carefully directed, deeply insinuating soft tissue manipulation should be applied to the shoulder itself, to the tissues around it, and to the cervical and dorsal spine in an over-all effort to restore a more efficient circulatory and nerve pattern through the involved parts. Such osteopathic lesions as may exist should be corrected if this can be accomplished without the use of forcing technics; since forcing technics applied to the cervical and dorsal spine will, on occasion, intensify the symptoms in acute cases. Daily administration of this type of manipulation will usually reduce the patient's discomfort to the point where more specific technics may be used.

Passive motion manipulation to the shoulder should be begun as soon as the patient can well tolerate it. In subacute and chronic cases this form of manipulation can often be instituted at the first visit, but again clinical judgment and experience must be called upon to determine just what procedures are best at each stage of treatment.

As discomfort decreases, the second objective, restoration of function, is attempted. The rapidity with which function may be restored depends upon the degree of pathologic organization which has taken place, and upon the physician's ability to disorganize that pathology, which in turn depends upon the ability of the patient's body to respond to attempts in that direction. The more chronic the case the more organized the pathology is likely to be. Adhesions, contractures, fibrosis, and the like must be broken down if full restoration of function is to occur. Manipulation cannot be "just applied" in these cases. It must be designed to accomplish definite ends, to break up those particular adhesions, to release those particular contractions or contractures, and to soften up specific areas of fibrosis. It must be designed not only to increase the range of motion in the shoulder but to increase the range of motion specifically in those directions in which motion is limited. For this reason it would seem to be impossible for anyone to demonstrate an over-all technic of manipulation for shoulder disability, except in principle. It is not the technic that counts. Anyone can work out a series of movements which, in theory, might be applicable to the disabled shoulder, but success in treatment will depend almost entirely upon the degree to which the operator uses his knowledge of anatomy, physiology, and pathology in the application of those technics. The second objective cannot be reached without due respect for these facts.

The third objective is to eliminate the mechanics of recurrence. Here the importance of a reasonably accurate diagnosis becomes most apparent, for to eliminate the mechanics of recurrence the cause must be eliminated. The cause must be known as surely as it can be determined, if it is to be eliminated. Again, elimination of the cause will depend upon the ability of the physician to apply his knowledge and upon the ability of the patient to respond. If the cause is not identified and eliminated, only something short of full and permanent recovery can be expected.

Full recovery from a single attack may satisfy the patient, but it should not satisfy the physician if the patient has given a history of recurring attacks in the past. In such cases the physician's job is to discover, if possible, the reason for these recurrences and to eliminate it, if possible. Recurring attacks may be due to chronic occupational strain, structural imbalance, focal infection, habitual exposure to draft, cold, or dampness, the effects of cerebral accident, coronary or anginal attacks, chronic upper respiratory disease, and various diseases of the chest, to name only some of the more important. Certain of the central nervous system diseases and any deformity-producing bone disease may also be at fault. Not all of these causes can be eliminated, but the third objective cannot be reached without a thorough consideration of them and a concerted attempt to minimize their effects to the greatest possible extent.

Chronic osteopathic lesion pathology is always present in these recurring cases. It may be either a cause or a result of the disability. It may involve only soft tissues, or it may also involve bony tissues. It may involve only one segment, or it may involve several. Its most frequent site is between the fourth cervical and third dorsal vertebrae. There is no doubt at all in my mind that treatment of a disabled shoulder cannot be completely successful unless and until this type of pathologic condition is eradicated. If it is conceived to be the cause, it must be eradicated in order to effect a cure. If it is a result, it must also be eradicated for it is very likely either to predispose to another attack of shoulder trouble or to produce its effects in some other part of the body.

I stress principle in the manipulative approach to shoulder problems because that maneuver which is effective in the hands of one operator may be ineffective in the hands of another. Each must work out his own procedures according to his appreciation of the pathologic condition present in the case at hand, according to the tolerance, age, and sex of the patient, the ability of the body to respond, associated or even apparently dissociated pathology elsewhere in the patient's body, and last but by no means least according to the size and shape of the patient as compared to the physician's own size and shape. Osteopathic reasoning and the application of well thought-out manipulative procedures is imperative if a high measure of success is to be achieved.

As a matter of fact, a technic originated on the spur of the moment, the result of osteopathic reasoning in regard to the case being treated, is often far superior to any of the so-called tried and true technics so often demonstrated at various teaching sessions. There should be more individual thinking and less following of someone else's suggestion.

Park Lane

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Clinical and Cultural Similarities of the Brucellae and Unidentified Brucella-Like Organisms

Kansas City College of Osteopathy and Surgery
Department of Bacteriology and Public Health
Richard G. Taylor, B.S., A.M., Chairman

Patrick Martin, B.S., M.S.
M. T. Pritchard, B.S., M.P.H.
J. Eugene Mielcarek, B.S., M.S.
James L. Rowland, B.A., M.P.H.

Kansas City, Mo.

HISTORICAL

The Brucellae have long been considered one of the most fastidious and difficult groups to cultivate. It is the purpose of this paper to review the cultural characteristics of this group and some of the problems involved in their cultivation and to draw an analogy to similar problems encountered in cultivation of apparently related organisms. This latter group appears to be more closely related to the Brucellae in the matter of clinical symptomatology than in cultural characteristics.

The media first used for growth of Brucellae by Zobell and Meyer[1] produced only slight growth because the accessory growth factors requirements were undetermined. These investigators showed that ammonium ion, organic acids, and cystine were essential for growth. Glucose utilization was reported in 1932 by the same investigators. Koser, Breslove, and Dorfman[2] first obtained abundant growth of Brucellae using a chemically defined medium consisting of seventeen amino acids, glucose, inorganic salt, thiamine, nicotinamide, biotin, and pantothenic acid. Koser and Wright[3] showed that the pyrimidine, but not the thiazole component, of thiamine is required by the organisms. Dick and McCullough[4] found niacin unessential to Brucella abortus and Brucella suis, but not to Brucella melitensis, or Brucella abortus stimulated by pantothenate; they also found biotin stimulatory only to Brucella abortus.[4] In 1947 McCullough and coworkers,[5] using an experimental medium, confirmed that magnesium salts were essential, and that manganese and iron salts were stimulatory. One per cent glucose was required for maximum growth. Addition of glucose, thiamine, and iron salts increased the yield of cells fivefold to tenfold.[5]

In their studies on the nutrition of Brucellae, Gerhardt and Wilson[6] formulated a medium which supported the growth of twenty-four of twenty-eight strains of these organisms. Additions to the basal medium of Koser, Breslove, and Dorfman which are of note are lactic acid and glycerol as carbon and energy sources and potassium acid phosphate and sodium sulfite as inorganic salt sources.[6]

Cole and Braun[7] have studied the effects of manganese and magnesium on growth and variation of the Brucellae. It was reported that presence of 0.013 molar or more of sodium pyrophosphate suppressed the establishment of rough variants from smooth broth cultures of Brucella abortus, and that this effect could be successfully antagonized by the simultaneous addition of manganese and magnesium. These investigators state that the effect of pyrophosphate may be its ability to remove free manganese and magnesium from the medium by forming metal complexes with these ions.

Organic or inorganic sulfur seems to exert no inhibitory effect on the growth of Brucellae. Rode, Lankford, and Schuhardt,[8] however, report that none of the cultures used in their investigation assimilated inorganic sulfur at an oxidation level above hydrosulfite. Of the organic sources of sulfur, l-cystine and l-cysteine were readily utilized in asparagine medium. Substitution of hydrogen peroxide treated casamino acids promoted utilization of methionine or cystathionine.

Cole[9] has shown that the effect of a number of metal complexing compounds on variation is complete suppression of smooth to nonsmooth variation in 10-day cultures. Of the compounds studied versene, sodium citrate, 8-hydroxyquinoline, and 8-hydroxyquinoline sulfate were mentioned. He suggests that manganese and possibly magnesium ion are involved in the chain of metabolic events which result in the appearance of nonsmooth variants.

Gerhardt and Gee[10] have established growth curves for shaker cultures in fortified tryptose broth. Employment of a heavy inoculum of actively growing cultures together with a highly aerated shaker system markedly decreased the growth period of the organism in broth culture and greatly increased the yield. Differences in the amount of inocula with the range employed manifested themselves primarily in the length of the growth period, but the rate and extent of growth remained virtually unaffected. Differences in the age of the culture employed as inocula apparently were of no significant effect in these respects.

In a later investigation Gee and Gerhardt[11] studied the effects of aeration on generation time. Using lard and mixtures of lard and tributyl citrate as antifoam agents and number 60 spargers, it was found that the generation time could be changed from 31.1 hours to 2.6 hours with an aeration change from one-quarter volume to two volumes per minute. These workers concluded that the aeration requirements of the organism in sparger systems were interdependent upon two factors. The first of these was the size and composition of the sparger used and the second, the antifoam agent necessary to control foaming.

During and since the investigations which have been discussed above, many methods for improving the cultivation and differentiation of the Brucellae have been published. Indeed, to discuss each method in this paper would constitute a lengthy repetitious discussion. However, there are three methods in use today which deserve mention at this time. It is first necessary to review the cultural characteristics of the type species, Brucella melitensis.

This organism, isolated by Bruce in 1887, has as its chief host the milch goat. It may also infect cows and hogs and be excreted in their milk. The bacterium is a short ellipsoidal rod, 0.3 μ to 0.4 μ in length, occurring singly and in pairs, rarely in short chains. The organism is nonmotile, Gram negative, nonacid fast, and nonsporogenous. Small, circular,

convex, amorphous, smooth, glistening, and entire colonies are seen on an agar plate. Within a week the agar turns brown with crystal formation.[12]

None of the carbohydrates commonly used in bacterial differentiation are fermented. Litmus milk is unchanged at 24 hours, but later becomes alkaline, and finally is reduced. Indole is not formed, but nitrates are reduced with the disappearance of nitrite. Urea is reduced to ammonia. There is sparse growth in gelatin without liquefaction.[12]

Since the cultural details of this organism are so similar to those of other members of the genus, the cultural method of differentiation must depend upon another factor. It has been shown that Brucella abortus requires an atmosphere of 10 per cent carbon dioxide for primary isolation, becoming aerobic only after several transfers. It is also reported that the browning of the medium with crystal formation is absent with this species.

A second method, and a more efficient one, depends upon the selective bacteriostatic action of dyes incorporated into a basal medium. The concentration of the dye depends upon the medium used. When Difco tryptose is used basic fuchsin, thionin, and crystal violet should be used in a final dilution of 1:1,000,000. Thionin will inhibit the growth of Brucella abortus, basic fuchsin will inhibit the growth of Brucella suis, but neither inhibits the growth of Brucella melitensis.

The third method of differentiation, which is the most rapid, depends upon agglutinin adsorption by the species in question. Brucella melitensis will be differentiated from Brucella abortus, and Brucella suis will be differentiated from Brucella melitensis, but not from Brucella abortus.

There have also been advanced procedures for differentiating smooth and nonsmooth colonies of Brucellae. One of the more simple and practical measures involves the use of modified albimi agar and various biological stains. White and Wilson[13] showed that on agar containing 2.5 per cent agar, 1.0 per cent glucose, and 5.0 per cent glycerol which had been inoculated and incubated for 96 hours, then flooded with crystal violet for 15 seconds, smooth colonies appeared light blue-green and nonsmooth colonies appeared red to blue-red. Safranine O showed smooth colonies to be colorless or faintly pink, while rough colonies appeared bright red-orange.

There have been a number of investigations concerning problems involved in blood cultures. Failures to obtain positive cultures have been variously ascribed to nutritional inadequacies of the culture medium and to the absence of Brucellae in the blood stream. A third possibility is that the organisms are present in 5 to 10 ml. blood specimens but their growth is suppressed by concomitant antibody, even though the latter may not be evident in the agglutinin titer. This hypothesis led Pickett and Nelson[14] to the discovery of Brucella phage in many of the bloods examined, and it now appears that it is the latter, rather than specific antibody, which is largely removed from washed specimens. These workers also determined that citrated broth could be incorporated into media as phage inhibitor.

Schuhardt, Woodfin, and Knolle[15] analyzed a similar problem. These workers determined that the blocking effect could be eliminated by heating. The test proved that the Brucella agglutinin blocking is due to an antigenic component, probably a nonagglutinating antibody.

Perhaps the most frequent problem encountered in culturing Brucellae in peptone media is the presence of an antigrowth factor. It appears that the factor is an amphoteric compound either present in the peptones in large amounts or present in association with neutralizing substances that accompany the toxic factor through the purification process.[16] Oxidized polypeptides or amino acids are suspected as the toxic agents.

MATERIALS AND METHODS

The materials and apparatus used in this work are among those acceptable in standard procedure and in most bacteriologic laboratories. The Brucellae cultures were obtained from the American Biological Culture Supply House. The media used are Difco dehydrated preparations, and the suggestions for preparing and sterilizing them which are provided by the company were followed in each case.

The apparatus in use is relatively new and in some cases was employed for the first time during this investigation. The autoclave employed is an upright electric type with automatic pressure and temperature control. The oven for dry heat sterilization is electric with an automatic thermostat. The incubator in use is double walled and insulated, with an inner glass door and an outer wooden door. The incubator was adjusted to a temperature of 37.5 C. with a sensitivity range of ± 0.5 C.

The methods followed in the investigation are summarized as follows: All cultures were first stained by Gram's method to determine purity of culture. Prior to inoculation the media used were incubated for 24 hours to ascertain sterility. After inoculation all cultures were incubated for a period of 72 hours. Readings were made at 24, 48, and 72 hour intervals. At these times staining reactions, cellular and colonial characteristics, and fermentation results were recorded. At the end of the incubation period subcultures for subsequent work were prepared.

RESULTS

The data comprising this paper have been accumulated and analyzed over a period of approximately 2 years. As a matter of convenience and clarity these findings have been summarized and are discussed under "Cultural Results" and "Clinical Findings."

Cultural Results.—Whenever an organism was isolated from an infection it was immediately put into pure culture and biochemical data obtained. It was then compared with members of the Brucellae and other members of the group. These data are tabulated in Table I.

Clinical Findings.*—The clinical picture presented by this group of organisms is varied and complex. The discussion of the data available is best divided under clinical symptomatology, organs infected, and laboratory findings. It should be borne in mind that brucellosis, both chronic and acute, is a systemic infection and that no tissue in the body is completely immune to attack. It has been reported that twenty-five organs have been infected with pathologic changes occurring. For this reason the following

*Clinical findings were determined through the courtesy of the R. G. Taylor Laboratories.

discussion concerns only the group of organisms as yet unidentified. The reader is referred to any of the excellent publications concerning the nature of Brucellae infections.

The following symptoms have been recorded from patients during this investigation. There is invariably anemia with pallor, nausea, vomiting, constipation, and anorexia. There may or may not be low shifting back pain or shifting chest pain. Abdominal cramps are common, though not always present. There may be marked jaundice, or it may be entirely absent. There is the typical undulating temperature during remissions of which the patient may experience a feeling of general well being. There may be purpuric or hemolytic area on the skin with or without areas of extreme tenderness. In numerous cases skin rashes may develop. There may be nocturnal chills and sweats. There are two syndromes, though rarely present, which are highly interesting. The first involves arthritic symptoms with acute muscular pain. The second is similar in appearance to acute intestinal influenza.

Other than the common local skin abscess, the following organs may be invaded: lymphatic glands, spleen, liver, bones and joints, vascular system, lungs, testicles, colon, gallbladder, placenta, and tonsils.

The laboratory findings are as follows: The red blood cell count is low; the white blood cell count is elevated, though there may be a leukopenia; the differential count shows a relative lymphocytosis. The globulin fraction of serum is elevated, but the albumin fraction is reduced. The pH of serum and tissue fluid is increased with an increase in the amount of substituted amines in the serum. Notable is the fact that antibody titers of the serum may or may not be elevated and are often not detectable. Characteristic of the urine is an increased pH and lipid fraction.

Sources of the infection examined by the workers included milk, beef, pork, sheep, goats, dogs, cats, guinea pigs, cattle, hogs, fowls, and humans.

DISCUSSION

It at once becomes apparent that the unidentified organism is similar to the Brucellae only in regard to Gram reaction, cellular characteristics, and colonial characteristics. This fact is confirmed by the fermentation reactions of the two groups.

The Brucellae do not constitute an active group biochemically and, as pointed out above, are often difficult to cultivate. The latter group, however, presents no problem in this respect. It may also be inflected at this time that although a lack of biochemical activity does not always indicate lack of pathogenicity, an organism with a broad spectrum of activity is very often capable of inciting infection. This is well exemplified by the members of the enteric pathogen group. Two criteria are available for determining this condition: proteolytic capacity of the organism and fermentative spectrum.

A number of the symptoms manifested may be accounted for while others still lack sound explanation. The anemia is, of course, due to the hemolytic activity of the organisms. Hemolysis of the red blood cells also accounts for the jaundice and purpuric areas in the skin. The nausea, vomiting, and other gastrointestinal symptoms are due to the production of histamine (and possibly other amines) by decarboxylation of histidine. This substance also produces the rashes commonly seen. The back, chest, and abdominal pains are ascribed to the production of endotoxins.

The laboratory findings are more fully explainable than the symptomatology. The low red blood cell count is again due to the hemolysis, while the relative lymphocytosis and elevated white blood cell count is a part of the immune response of the host. The elevated globulin fraction in the serum is due to the actual presence of the organisms and withdrawal of globulin from the tissue. The elevated pH

TABLE I

Organism	Cells	Colonies	Dextrose	Lactose	Maltose	Saccharose	Mannitol	Xylose	Rhamnose	Insulin	Gelatin	Hemolysis
Brucella melitensis	Gram negative, coccoid bacilli, 0.3-0.4 μ singly, paired, nonflagellated, nonsporogenous, nonacid fast	Small, circular, convex, entire, amorphous, butyrous, glistening	GNC‡	GNC	GNC	GNC	GNC	GNC	—	GNC	—	—
Brucella abortus	"	"	GNC‡	GNC	GNC	GNC	GNC	GNC	—	GNC	—	—
Brucella suis	"	"	GNC‡	GNC	GNC	GNC	GNC	GNC	—	GNC	—	—
Strain #100†	0.3-2.0	Not amorphous, but glistening	AG§	AG	AG	AG	A	A	A	GNC	+	Hemidigestion with darkening of medium
Strain #101	"	"	A‖	A	AG	AG	A	A	A	GNC	+	"
Strain #102	"	"	AG	AG	A	AG	A	GNC	A	GNC	+	"

†Apparently biochemical varieties of the same organism.
‡Growth with no change in reaction.
§Acid and gas production.
‖Acid production.

of the serum and tissue fluid is due to the production of histamine and other substituted amines. This fact also accounts for the increased urinary pH. The fact that antibody titers may or may not be elevated is due to the production of a heat labile Brucella-agglutinin-blocking factor. This blocking factor may be removed by heating serum to 50 C. for 30 minutes. The fact that blood cultures may be negative is due to the presence of Brucella phage.

CONCLUSION

From the foregoing work two conclusions have been drawn: (1) While somewhat similar to Brucellae in cultural characteristics, the organisms in question are more closely related regarding the clinical symptomatology produced—an acute or chronic febrile condition. (2) The organism, an active pathogen capable of inciting infections in a wide range of hosts, does not lie in the same taxonomic group as the Brucellae.

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Symposium: The Knee Joint*

Applied Anatomy

W. FRASER STRACHAN, D.O.
Chicago

The knee joint has a remarkable combination of freedom of movement and stability. In most of the other synovial joints, when one of these qualities is definite the other is rather deficient.[1] Stability at the knee is attained not by the exact fitting of opposing articular surface or by the strength of capsular ligaments. The important factor is the number of strong muscle tendons which traverse the joint. As Cunningham stated: "Here, to a large extent, the muscles *are* the ligaments."[2]

Anteriorly the quadriceps extensor muscles converge toward the patella. The central fibers insert on the tubercle of the tibia by way of the intervening patella and patellar tendon. The more lateral tendinous fibers blend with the fascia lata and insert as the patellar retinacula on the tibial condyles lateral to the tubercle. As a general rule, the investing layer of deep fascia envelops the muscles in the manner of a sleeve, but where bones or ligaments are not covered by muscle they receive attachment of the fascia. Hence, the fascia lata in the anterior region of the knee blends with the periosteum of the patella, tibial condyles, and fibular head, and with the patellar tendon and retinacula. This combination of fascia and muscle tendons constitutes the anterior "ligament" of the knee.

On the medial side of the knee the investing fascia receives expansions from the tendons of the sartorius, gracilis, semitendinosus, and semimembranosus muscles. Elsewhere it fuses with the periosteum of the subcutaneous surfaces of the bones. Another restraining factor is the medial ligament (ligamentum collaterale tibiale). Its deepest fibers have an important attachment to the medial semilunar cartilage; some of its superficial fibers are continuous with the adductor magnus tendon.

The fascia lata is aponeurotic and thickened on the lateral side of the thigh as the iliotibial band, into which superiorly is inserted the tensor fasciae latae and most of the gluteus maximus muscle. Distally the band inserts into the lateral condyle of the tiblia and is blended with fibrous expansions from the vastus lateralis and biceps femoris muscles. The lateral ligament (ligamentum collaterale fibulare) is round and cordlike; it is intimately blended with the fascia lata, but entirely separate from the capsular ligament. As it extends from the lateral epicondyle of the femur to the fibular head it splits the tendon of the biceps femoris muscle.

The fascia forming the roof of the popliteal space is thickened by transverse fibers. The posterior ligament of the knee is a ligamentous feltwork of intersecting bands which are partly capsular and partly tendinous in nature. The stronger central portion is formed by an expansion from the semimembranosus tendon which turns upward and laterally, and is called the oblique posterior ligament. It is obvious that the other hamstring muscles limit extension of the knee although they are not fused with the capsule. The anterior cruciate ligament is tensed in the extended position of the knee and bears much of the strain of forced extension. It also prevents the tibia from moving forward on the femur.

The investing fascia has a similar attachment at the hip and ankle regions, although the arrangement differs according to the configuration. It is attached proximally to the iliac crest, the sacrotuberous liga-

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ment, the ischium, the pubic arch, the pubic symphysis and crest, and the inguinal ligament. A sacroiliac lesion may change the tensions in the muscles and fascia extending from the innominate to the tibia or the fibula enough to affect the knee and predispose it to lesioning.

Below the knee the investing fascia is fused with the periosteum over the subcutaneous surfaces of the tibia and fibula. At the ankle it is strengthened by transverse fibers which form thickened bands called retinacula which bind down the muscle tendons.[1] There are two extensor retinacula, two peroneal retinacula, and a flexor retinaculum.

The investing fascia of the thigh and leg gives attachment by its deep surface to the major intermuscular septa which act as partitions between groups of muscles with dissimilar actions. There are two such septa in the thigh, a medial and a lateral septum each attaching deeply to the linea aspera of the femur. Minor, less distinct septa separate the individual muscles. Whenever two adjacent muscles are so similar in attachments and action as to be practically indistinguishable, the fibrous layer between them is correspondingly thin, and it can be said that the muscles fuse with each other in this area. An example in the thigh is the relation of the vastus intermedius to the vastus lateralis.

There is an inclination to think of muscles as taking origin primarily from bone and causing the bone to become roughened as it grows. Actually the crests and borders of long bones indicate the line of attachment of fibrous sheets which may be, according to location, investing fascia, intermuscular septum, or interosseous membrane. In the thigh the linea aspera of the femur gives attachment to the medial and lateral intermuscular septa. Direct muscle origins and insertions at the linea aspera are all aponeurotic in nature. In the leg the tibia and fibula both have an interosseous crest for attachment of the interosseous membrane. The other borders of the tibia give attachment to the investing fascia; the other borders of the fibula give attachment to intermuscular septa.

The action of muscles of the extremities is evidenced in the motions at the joints—one bone moves in relation to its neighbor. To accomplish this, the muscles must, of necessity, attach to one bone, extend past an articulation, and attach to the next bone. It has been shown that the muscles, to a great extent, are attached to bones indirectly through fascial sheets including intermuscular septa and interosseous membranes.

The implications up to this point are as follows: The function of a joint is twofold. It allows a certain range of movement, and it resists movement beyond a point of limitation. At the knee the muscles are unusually important in resisting excess movement and also, when irritated, in excessively resisting movement. In other words, the antagonistic action of the knee-moving muscles becomes excessive when the muscles are irritated. This is the splinting of acute lesions. The muscles which restrain knee movement have important fascial relations both in the areas of origin and at the insertions around the knees. Therefore, thought should be given to the mechanical role of the fascia in knee problems, whether acute or chronic, primary or secondary. Still,[3] more than 50 years ago, and others[4] since have stressed the importance of fascia as a site of pathologic conditions associated with and characteristic of the osteopathic lesion.

The roof of the popliteal space behind the knee is a thin strong sheet of deep fascia.[5] The floor is formed by the popliteal surface of the femur, the oblique popliteal ligament of the knee, the upper end of the tibia, and the fascia covering the popliteus muscle. Medially it is bounded by the semitendinosus and semimembranosus above and by the medial head of the gastrocnemius below. On the lateral side is the biceps femoris above and the plantaris and lateral head of the gastrocnemius below. The space is subject to a marked change in size and contour as the knee is moved from extension to flexion; the muscles of the boundaries are the flexors of the knee. In the extended position the popliteal space is straight, flattened, and its boundaries taut, thus reducing its size. When the knee is in the flexed position the reverse is true.

This change in size and shape of the popliteal fossa with movements of the knee is significant in the drainage of blood and lymph from the foot, leg, and knee. Only the great saphenous vein and corresponding lymphatics by-pass the popliteal space. The change in pressure coincident with variation in size of the popliteal space is a means of moving fluids in the popliteal vein, its tributaries, and the corresponding lymphatics, all of which are well supplied with valves.

Hilton's law indicates that the same nerve trunk which supplies the muscles of a given joint supplies also the muscles which move the joint and the skin over the muscle insertions. The femoral and obturator nerves have articular branches to both the hip and knee joints. The anterior part of the sacral plexus sends articular branches to both joints either by way of the medial popliteal part of the sciatic nerve or the nerve to the quadratus femoris muscle.

A number of the thigh muscles are biarticular in function, having the ability to move either the hip joint or the knee. Examples are the hamstrings, innervated by the sciatic nerve, the sartorius and rectus femoris, innervated by the femoral nerve, and the gracilis, by the obturator nerve.

This similarity in nerve supply makes it easy to understand how a source of irritation at the hip joint may be interpreted as coming from the knee.

The reflex splinting of the thigh muscles when the knee joint is irritated is evidence of a close functional relationship. This secondary spasm is not diffuse and widespread; it is localized to prevent or reduce that particular motion which is unacceptable to the joint. The same selectivity is seen in the reflex activity of the small deep muscles of the spine related to individual spinal joints. Regardless of whether the primary irritation or injury is sustained by the joint or by the muscles which move it, both structures are functionally involved almost immediately.

A reflex type of spinal muscle tension has been found rather consistently at or near the second lumbar segment when the knee is acutely irritated. Appropriate spinal manipulation to reduce this pathologic reflex lesion will tend to produce improvement at the knee. In fact, if the irritating factor is no longer active, the reduction in knee symptoms from treat-

ment of the lumbar lesion may be immediate and definite.

SUMMARY

1. The anatomy of the knee has been discussed.
2. The twofold function of the knee joint has been mentioned.
3. The role of the fascia in knee lesions has been explained.
4. Reflex splinting of thigh muscles and reflex spinal muscle tension in knee joint irritations have been discussed.

1525 E. 53rd St.

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A Study in Osteopathic Mechanics

GEORGE W. NORTHUP, D.O.
Livingston, N.J.

The knee joint comprises one of the most intricate areas of man's musculoskeletal system, and its mechanics and structural lesions constitute one of the greatest problems. The present study is an effort to clarify various theories and principles of diagnosis and treatment as applied to this problem.

LESIONS OF KNEE JOINT

Despite the fact that the knee is one of the most commonly injured joints, relatively little has been written concerning it in the literature of the osteopathic profession.

The proper function of any one joint area is dependent to a greater or lesser degree upon the proper function of the total musculoskeletal system. One cannot just "treat" a painful knee without considering the totality and interrelationship of body parts and physiologic systems. However, when a traumatic force is applied to a joint area, certain specific principles of diagnosis and manipulative technic should be applied to that localized area.

In order to understand mechanical lesions of the knee joint it is necessary to understand something of its applied anatomy. If it is true that one of the factors of the osteopathic lesion is that it is a functional disorder in the synergism of joint motion, then the various components entering into the stability and mobility of the joint must be known and understood.

The knee, being the largest single joint in the body, is midway between two mechanically complex areas—the foot and the low back. The interrelationship is so close that when malfunction occurs in one area, the effect is transmitted by the force of gravity and related stresses and strains.

If osteopathic joint lesions are disorders in the synergism of physiologic movements, the first consideration is the average normal motions permitted by the joint area under study.

MOVEMENTS OF KNEE

The knee joint itself is capable of the following movements: (1) extension, (2) flexion, (3) rotation, and (4) sidebending. Nelson[1] has stated that if any one motion of a joint is limited all others are limited to a greater or lesser degree. If this is true of spinal joints, it is equally true of the knee. A second factor is that lesioning seems more likely to occur in those joint actions which have a lesser range of normal motion. Although flexion and extension of the knee joint are gross motions which are frequently restricted, the actual lesioning factor occurs more frequently in sidebending and rotation. This principle would seem to apply to other lesioned areas.

The history of the complaint of pain in the knee is most important. If the knee has been acutely traumatized, a knowledge of the direction and force of the trauma will yield much valuable information. The more complete the history, the better is the likelihood that an accurate diagnosis will be made. Neoplastic diseases, metabolic disturbances, and infectious processes must all be considered—particularly in pain and dysfunction of long standing. This paper, however, will deal specifically with musculoskeletal disorders of a mechanical nature.

If the osteopathic lesion complex is a dynamic disorder involving motion, tests for motion must be used as part of any such diagnostic survey. Tests involving ranges of movement are valueless unless the applied anatomy of the knee joint and related structures is understood.

TESTS FOR MOTION

Every physician dealing with these problems should examine as many normal knee joints as possible. By so doing he comes to understand the many different types of anatomic variations which modify average function.

The examination of the knee starts at the feet and ends with the head. Remote structural and postural patterns modify and affect local body mechanics.

Flexion and extension are easily checked. There are, however, fine points of diagnostic differentiation which are important enough to mention.

In most mechanical disorders of the knee joint the gross motions of flexion and extension are modified. The degree of modification should be noted on the examination sheet so that progress notes may be informative. In testing for extension, it is not sufficient to discover whether the patient is able to straighten his leg on the table or walk correctly. It is well to remember that the knee is rarely in complete extension when the patient stands; a slight degree of flexion is the rule. However, many patients cannot fully extend their legs either in the upright or supine position. Mennell's[2] test of knee extension, complete or incomplete, follows: The patient is supine. With one hand the physician raises the patient's heel slightly

off the table. He places his other hand over the posterior surface of the lower end of the femur and rotates the hip outward. The knee joint is flexed about 15 degrees. The patient is carefully instructed to let his leg become completely limp. The operator's hand supporting the lower end of the femur is removed and the knee is allowed to drop into extension. Where extension is obviously impaired, this test is unnecessary. It is valuable in the detection of minor restrictions. Mennell cautions that movements to correct extensor limitations should never be attempted until all other possible movements at the joint have been performed. He further states that traction must not be applied as a mobilizing force except with the knee flexed unless full extension can be secured without trace of strain. Both of these statements have been verified by my own experience.

After extension of the knee has been tested, flexion is tested in the usual manner. When testing the range of this movement it is well to remember that the thigh should be first flexed over the abdomen as far as is possible, before accurately estimating the degree of flexion at the knee.

Lateral or medial flexion (sidebending) of the knee, being one of the lesser movements of the joint, is more difficult to analyze. It is best tested with the knee in a slight degree of flexion. The patient is still in the supine position; his ankle is placed between the operator's knees and firmly clasped. The operator's hands grasp the knee just below the joint and the thumb or index finger of both hands simultaneously palpates the interval between the condyles of the femur and tibia on both sides. Holding the ankle stationary, the operator attempts to sidebend the knee by pressing medially and then laterally with his hands. Motion, increased or decreased, can readily be detected. In the occasional knee capable of hyperextensibility, this movement may have to be evaluated with the knee in *average* full extension. Circumduction, both clockwise and counterclockwise, may also be done as a further check. The diameter of the circle in circumduction is permitted by the amount of lateral (sidebending) motion allowed by the lateral ligaments.

Rotation of the tibia on the femur or the femur on the tibia should next be tested. The patient remains in the supine position and his thigh is flexed as far as possible over the abdomen. Rotation (internal and external) is tested with one hand placed over the knee so that the thumb and index finger are resting over the anteromedial and anterolateral aspects of the joint spaces. Rotation is tested by grasping the foot in such a manner that the tibia can be rotated in both directions. Caution must be observed in this test so that movement does not occur at the ankle joint.

ROENTGEN STUDIES

After the history and tests for motion have been recorded, it is important to make adequate roentgen studies. These should include sufficient visualization of the patella, head of the fibula, and the tibial tuberosities. Pathologic changes, including fractures, are often overlooked in these areas.

APPRAISAL OF FUNCTIONAL PARTS OF KNEE JOINT

The next step is a diagnostic appraisal of the functional parts of the knee joint, with particular emphasis on the following:

1. Quadriceps femoris muscle group
2. Hamstrings
3. Tibial and fibular collateral ligaments
4. Cruciate ligament tears
5. Lateral and medial menisci
6. Infrapatellar fat pad
7. Bursae of the knee
8. Patella and patellar ligament
9. Femorotibial articulation
10. Proximal tibiofibular articulation

Quadriceps Femoris.—Probably no single structure has more to do with stability of the knee joint than does this muscle group. This particular group loses its tone and atrophies faster than almost any other such structure in the body. An entire paper could and should be written on its importance. Recently I addressed a sizable group of physicians and and no one knew a test for its functional capacity! It is simply and easy to perform. The patient sits on the edge of the table with his legs hanging over the side. The operator places both hands over the middle of the tibia. The patient is asked to push with his legs against the resistive effort of the operator. This readily shows a weakness of the affected side in comparison to the other. The operator then places one hand over the quadriceps femoris group, and as the muscles are contracted again, the operator can judge the amount of loss of tone and atrophy.

Hamstrings.—With the patient prone, areas of contraction can be noted while the ability of these muscles to move against resistance is tested. Contraction of these muscles and pain in the posterior aspect of the knee are often present as a result of lumbar lesions.

Tibial and Fibular Collateral Ligaments.—Tears and strains involving these ligaments are common. The tibial collateral ligament is more frequently involved than is the fibular ligament. The abduction-adduction test described in standard orthopedic texts is valuable in differentiating these lesions from pathologic changes in the menisci. Complete tears require prompt surgical repair. However, strains and minor fiber tears are fortunately the more common type. Point tenderness is often hard to differentiate from meniscus injury; in fact, they are often associated. The point of maximum tenderness is usually over the bony insertion of these ligaments.

Cruciate Ligament Tears.—These ligaments are often strained but not too commonly torn. The "drawer" test is usually adequate for the diagnosis of this condition. The patient is supine on the table. The operator places his hands behind the tibia of the semiflexed knee. The tibia is pulled forward to test the integrity of the anterior cruciate ligament and pushed posteriorly for testing the posterior cruciate. Both legs should always be tested for comparison.

Lateral and Medial Menisci.—Injuries involving the menisci are numerous and a subject of considerable controversy. Most osteopathic authors believe that tears of the menisci are not as common as previously thought. The fact that the menisci, particularly the medial, is torn with a resulting severe disability is an indisputable fact. However, too many less severe involvements of the menisci are poorly diagnosed and treated. The result is that many patients spend the rest of their lives with "trick" knees. Stinson[3] carefully dissected the knee joints of eight-five cadavers and found less than 1 per cent with any evidence of tearing injuries either to the menisci or the ligamentous

attachments. However, these figures do not discharge any responsibility for considering such injuries in the evaluation of these cases.

Although locking of the joint is a significant finding in these cases, there are tears of the menisci in which locking does not occur. This is particularly true where the severance of meniscal continuity occurs either at the middle of the joint or posteriorly to it. Standard orthopedic tests such as those described by Apley[4], McMurray[5], and Finochietto[6] are extremely useful.

Infrapatellar Fat Pad.—In the space between the patella and the tibia and just beneath the patellar ligament lies a triangular mass of fat. Abnormalities here can cause knee disability, which may be associated with a general synovial reaction. There is a report of fifteen such cases in a series of 190 arthrotomies.[7] It usually has a gradual onset with a history of occasional aching. Swelling may be considerable. Pain is felt on either side of the patellar tendon or directly over it.

Bursae of the Knee.—A discussion of the bursae is hardly in the province of this paper; however, accurate knowledge of their anatomic location is necessary for differential diagnosis. One or more bursae are usually involved in most traumatic injuries to the knee, but are usually secondary to other conditions. Involvement of a bursa is often the result rather than the cause of other disabilities.

Patella and Patellar Ligament.—

The patella and its ligament should be carefully studied in all knee joint disabilities. All roentgen studies of the knee joint should include adequate visualization of the patella. Many chronic knee disorders or acute conditions which resist therapy are due to a failure to establish normal patellar movement.

The patella should particularly be checked for restriction of motion. Perhaps the downward motion of the patella is most frequently involved and often prevents full and easy flexion. No manipulative measures involving full flexion of the knee should be attempted until patellar motion is checked and any restriction is corrected. Freedom of patellar motion in all directions is imperative in the adequate management of knee joint injuries.

Femorotibial Articulation.—

In the opinion of most osteopathic authors, this is the most frequently involved lesioned area in the knee. As previously stated, the motions most commonly affected are those of rotation and sidebending. These lesions involve medial displacement of the femur on the tibia which may be associated with external or internal rotation of the tibia. Lateral slips of the femur, with or without associated external or internal rotation, occur less commonly.

I have also noted that an anterior or posterior slipping of the femur on the tibia may occur. It is my opinion that the majority of knee lesions are a complexity of these problems.

Perhaps the most common injury occurs with the body in *forward motion,* the knee semiflexed, and the tibia in a position of external rotation. A strain or weakness on the lateral side of the knee allows the femur to continue its forward path, while it is restricted by the externally rotated foot and leg in a static weight-bearing position on the floor. Thus the femur is allowed to continue its straining force in an anterior and medial direction, with a torsion force being superimposed by the externally rotated tibia. A "binding mechanism" maintains the structures in partial fixation in this position. The menisci and collateral ligaments are necessarily involved because of their bony attachments, but it is only with extreme trauma that the cruciates are severely injured.

In examining for these lesions it is well to remember that motion directed toward the lesion position is more free than that directed toward the correction. For example, when the knee is lesioned with the femur partially fixed in an anteromedial direction, posterior movement of the tibia on the femur or anterior motion of the femur on the tibia is not met with the same resistance as motions in the opposite direction.

The same principle applies to both sidebending and rotation.

Corrections of errors in free sidebending and rotation should be made before any forceful movements are considered in the correction of flexion and extension defects. In fact, gross, painful, long-leverage manipulations to the knee joint are rarely necessary, and frequently are contraindicated.

Proximal Tibiofibular Joint.—Lesions involving this articulation are common. Patients often complain of pain in the lateral aspect of the knee with associated leg and ankle pain. Usually the fibula is partially restricted in a posterior and upward position although the reverse sometimes occurs. The physician can test motion at this joint rather easily by placing his fingers behind the head of the fibula and his thumb over its anterior surface. The test is made by rocking the head of the fibula backward and forward, noting motion restriction and evidence of pain.

RELATIONSHIP TO PELVIS AND SPINE

It is almost axiomatic that the knee joint is never in trouble by itself. If the pelvic and spinal structures are not involved in the initial stress, they most certainly are by the time the patient reaches the doctor. Commonly lesions are found in the low-back area and in particular around the second lumbar level. The lesions are usually those in the position of forward bending, rotation, and sidebending. Pain in this area is frequently elicited by palpation. Treatment to this area must not be neglected. Indeed it is usually wise to apply manipulative measures to this area before attempting local measures.

RELATIONSHIP TO FEET

Because of the relationship of the distal fibular and tibial mechanics to foot function, correction of mechanical difficulties in this area should not be overlooked. Lesions of the talus, calcaneus, and cuboid are particularly common. One clinician reports the correction of malfunction of the joint between the tibia and talus as being responsible for improvement in knee problems of long standing.[8]

SUMMARY

The details of examination may seem too minute to be practical. However, the care of these cases must involve certain key structures, if consistently successful results are to be expected. By establishing a diagnostic routine, the examination is far less time consuming than it may appear. The knee can no more be examined and treated as a separate autonomous unit than can any other portion of the body. With these

basic factors in mind, treatment will be more successful. Many physicians inform me that knee problems are the most difficult of all their office cases. These difficulties can largely be removed by a more systematic, anatomic approach to the problems.

104 S. Livingston Ave.

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Management

GEORGE A. LAUGHLIN, B.S., D.O.
Kirksville, Mo.

In the management of knee injuries, two basic considerations are involved—what is the nature of the injury and what is the method of approach to restore normal physiologic integrity? The injury may be either primary or secondary. The primary injury has as its target the knee joint itself, hence the term "primary." Secondary injuries most frequently occur from structural changes of the spine, pelvis, and femur heads superiorly or the feet and ankles inferiorly. These are ordinarily classified as compensatory injuries.

The question of the best method of approach for restoring normal function, I think, can be answered by a statement made by Dr. Still.[1] While I have heard many people say Dr. Still's writings are from another era and, therefore, difficult to understand, this particular paragraph can be understood by all.

I want to make it plain that there are many ways of adjusting bones. And when one operator does not use the same method as another, it does not show criminal ignorance on the part of either, but simply the getting of results in a different manner. A skilled mechanic has many methods by which he can produce the desired result. A fixed point, a lever, a twist, or a screw power, can be and are used by all operators. The choice of methods is a matter to be decided by each operator and depends on his own skill and judgment. One operator is right handed, the other left. They will choose different methods to accomplish the same thing. Every operator should use his own judgment and choose his own method of adjusting all bones of the body. It is not a matter of imitation and doing just as some successful operator does, but the bringing of the bone from the abnormal to the normal.

Keeping this idea in mind, I shall examine and utilize the approach which Sutherland has offered the osteopathic profession via the reciprocal ligamentous tension technic. In his carefully written explanation of Sutherland's ligamentous technic, Lippincott[2] states:

Osteopathic lesions are strains of the tissues of the body. When they involve joints it is the ligaments that are primarily affected so the term "ligamentous articular strain" is the one preferred by Dr. Sutherland. The ligaments of a joint are normally on a balanced, reciprocal tension and seldom if ever are they completely relaxed throughout the normal range of movement. When the motion is carried beyond that range the tension is unbalanced and the elements of the ligamentous structure which limit motion in that direction are strained and weakened. The lesion is maintained by the overbalance of the reciprocal tension by the elements which have not been strained. This locks the articular mechanism or prevents its free and normal movement. The unbalanced tension causes the bones to assume a position that is nearer that in which the strain was produced than would be the case if the tension were normal, and the weakened part of the ligaments permits motion in the direction of the lesion in excess of normal. The range of movement in the opposite direction is limited by the more firm and unopposed tension of the elements which had not been strained.

In discussing ligamentous strains Magoun[3] says:

Strains producing spinal lesions are influenced and modified by both the design of the articular surface and the arrangement of the ligaments. These ligaments are so constituted that the articular surfaces are almost always opposed under an ideal working tension which is balanced in all ranges of motion. They have a resiliency to accept strain up to a given threshold, beyond which the equilibrium of the joint is lost so that it operates on an unbalanced basis. Since the force has acted on both the articulation and the ligaments it is called a ligamentous articular strain.

Having just heard an excellent discussion of the applied anatomy of the knee joint, I should like to emphasize one point in the anatomy in order to clarify further the reciprocal ligamentous tension approach. Strictly speaking, the articular capsular ligament is but one of the several external groups of ligaments, but, setting aside technicalities, it can be imagined as an articulation with *one* capsular ligament composed of the entire group of external ligaments, each portion having a distinct name (according to its location) and function, which works in reciprocation with its fellow on the opposing side. If this is accepted as far as the external grouping is concerned, then it will be possible to visualize the internal structure as one unit with each of its individual components taking part in a never-ending reciprocation during motion.

In this very simplified form, I have pictured the normal joint being maintained without strain by the balance of half of this encapsulating ligamentous structure acting against the other half. If a lateral and a medial portion are considered instead of an anterior and posterior portion, the same picture of balance operates; here, however, the medial and lateral structures maintain a balance which precludes side-bending at the knee joint and also precludes tibial torsion during the normal motions of flexion and extension which characterize this articulation. This balance is present at all times although the balance found in a lesioned knee joint will not be identical with the balance which is found in the joint having normal motion or function. On testing, the lesioned knee will show that the balance is accommodating or compensating for a structural malalignment or for a strain. This new point of balance has deviated to a demonstrable extent from the normal point of balance.

In the diagnosis of knee injuries several factors are of prime importance:

1. Case History: When and how did the injury occur? Has the patient had this complaint before? Does the patient have a history of complaint of other weight-bearing structures?

2. X-Ray Examination: Is there evidence of fracture, frank dislocation, benign neoplasms, or other surgical problems? Is there evidence of disease of the bone or joint?

3. Physical Examination: Are there structural problems in the spine, pelvis, heads of the femur, ankles, and feet? Does the involved knee present an acute or chronic picture?

With all of these questions answered adequately, diagnosis should be fairly easy. However, the question of what has happened to the knee joint still remains. Here I am reminded of a phrase I have so often heard, "anatomy properly understood." The physician must know and visualize the anatomy of the knee joint before diagnosis and correction can be obtained.

Before I discuss any specific technic for knee injuries I should like to clarify a few terms. A *fulcrum* is a support upon which a lever rests, like the sawhorse over which a teeter-totter moves. It is the still point. *Disengagement* is the separation of two adjoining areas by a force, when these two areas are held together by common agencies. *Exaggeration* is carrying the lesion into the direction toward which that lesion occurred.

The term "exaggeration" is often misleading. Hulett[4] offers a good explanation:

> In the exaggeration of the lesion several objects may be had in view. In the first place the measure tends to *free the articular structures,* just as the driving in a trifle will free the articulation of a nail with wood in which it is imbedded and permit it to be withdrawn more easily. In the second place the movement effects *a stretching and relaxation* of the deeper structures which in numerous cases is all the relaxation that is called for. Finally, there is secured the *benefit of recoil* which results from the stretching of the tissues and aids in initiating the movement backward toward the normal position.

Or again referring to Lippincott's[2] article:

> Since it is the ligaments that are primarily involved in the maintenance of the lesion it is they, not muscular leverage, that are used as the main agency for reduction. The articulation is carried in the direction of the lesion, exaggerating the lesion position as far as is necessary to cause the tension of the weakened elements of the ligamentous structure to be equal to or slightly in excess of the tension of those that were not strained. This is the point of balanced tension. Forcing the joint to move beyond that point adds to the strain which is already present. Forcing the articulation back and away from the direction of lesion strains the ligaments that are normal and unopposed. . . .

The point of ligamentous balance is the crux of the whole endeavor. The point of ligamentous balanced tension is the point in the range of motion of an articulation where the ligaments are poised between the normal tension present throughout the free range and the increased tension preceding the strain or fixation which occurs as a joint is carried beyond its so-called normal physiologic range.

To demonstrate this principle I shall consider in detail one specific technic for the knee joint. For simplicity, I shall use one of the most frequent types of knee injuries, one with a history of frequent dislocations of the medial semilunar cartilage, in which the dislocation each time was reduced by the accepted orthopedic standard. These attacks occur more and more frequently and the patient soon has a great deal of continual discomfort on the medial side of the knee. When the medial semilunar cartilage is dislocated there occurs at the same time a fairly forcible rotation of the tibia, especially on the medial condyle. Therefore, to me it is reasonable that, although the cartilage itself can be fairly easily reduced, unless the rotation of the tibia is corrected, further semilunar difficulty will be encountered. With this type of lesion as an illustration I shall apply Sutherland's[2] technic for correction set forth by Dr. Lippincott.

> . . . the patient is seated with the involved leg balanced over the opposite knee. Facing him, the operator places one hand on the knee and grasps the foot, just below the ankle, with the other hand. If the lesion be of the medial condyles the operator provides a fulcrum on the lateral condyle of the tibia with his thumb, one or two fingers are on the medial condyle for palpation, the knee is carried medially and upward, tipping the foot laterally and downward, to disengage the lesioned joint surfaces and tense the ligaments. The tibia is rotated externally or internally by the other hand at the foot to exaggerate the lesion position to the point of balance. The patient is then instructed to resist the turning of his foot and the result of that effort is to glide the medial condyle of the femur into its proper position on the tibia.

The term "respiratory technic" is often used when this particular phase of osteopathic management is utilized. "Respiratory cooperation" is a frequently used synonym. What takes place or happens during the various phases of respiration which may assist in lesion correction is debatable. Most of those who have utilized respiratory cooperation of the patient do know it enhances endeavors. This last winter during a clinical conference in Kirksville a morning session was devoted entirely to the discussion of this particular subject. To me one of the most important points in the discussion was a statement by Sutherland[5] in which he said that if the lesion involved is placed in absolute balanced ligamentous tension, correction will occur and respiratory cooperation will not be necessary. To me this means that many of us do not realize when we have corrected or normalized a lesioned situation and therefore have to call on other efforts for help.

There are several modifications of these principles and all have taken their proper place. Slocum[6] has done some outstanding work with a type of technic called "articular ligamentous release" using the same fundamental principles of balanced or reciprocal ligamentous tension.

Even though the tibiofibular articulation is not classified as a part of the knee joint proper I must mention the importance of the fibula. In my clinical experience, it is the most frequent and troublesome offender of the whole lower extremity. Therefore, I think it appropriate to quote one technic which demonstrates the ease of using this same principle of correction.

> Most lesions of the fibula affect both its proximal and distal articulations and cause added tension through the interosseous membrane which is in close proximity to the vessels of the leg. Tenderness, disturbances of the ankle joint and circulation of the foot, and limited motion of the fibula in relation to the tibia give evidence of the lesion. For correction the patient sits with his leg, near the ankle, over the other knee. The operator holds both ends of the fibula anteriorly with his fingers to the point of balanced tension of the ligaments. The patient dorsiflexes and externally rotates the foot and presses downward on the knee or lifts it upward and medially with his hand. This rotates the fibula and releases it at both ends from the tibia and from the astragalus. Further disengagement and correction are accomplished by

the patient drawing the leg backward away from the operator and moving it lengthwise of the fibula as the operator holds that bone anteriorly with his fingers.[2]

SUMMARY AND CONCLUSIONS

The management of knee injuries involves two basic considerations: diagnosis of the type of injury and the approach to or technic of normalization. I have stressed the reciprocal balanced ligamentous approach, using the simple mechanical idea of reciprocal tension. This idea is explained by showing how any joint that is maintained in a functional condition must have a reciprocal tension in all its ligamentous or binding substance, such as would be required of an ordinary clothes pole with its guy wires. However, if a portion of this ligamentous material becomes overbalanced by external force or injury, the perfect normal is substituted by an imperfect or unphysiologic normal. Similarly, if the clothes pole is not upright it will lean toward the side on which the tension is greatest. Keeping this simple mechanical principle in mind, it should be easy to comprehend how a disturbance could occur and, by using the same principle, how it could be rectified.

I have given a definition of ligamentous strains which shows that a lesion may occur when reciprocal ligaments are carried beyond their threshold of resistance when the equilibrium of the joint is lost.

The importance of applied anatomy of the knee has been pointed out.

I also have stressed the importance of clarification of terminology.

Technic itself is up to the individual. I feel no more capable of trying to teach anyone technic than Babe Ruth would have been to teach prospective ball players to hit home runs. The important thing is to know the diagnosis, the anatomy of the area involved, and the principles of correction and to apply them individually.

Two aphorisms of Dr. Still are pertinent to this discussion:

"An intelligent head will soon learn that a soft hand and a gentle move is the hand and head that get the desired results."[7]

"The more you talk, the less you say. Do something."[8]

711-15 W. Jefferson St.

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Surgical Management

DONALD SIEHL, D.O.
Dayton, Ohio

Surgery in or about the knee joint is indicated frequently. Many knee injuries sooner or later require surgical intervention, although in the majority of cases conservative treatment is indicated. Since it is the largest and most complicated joint in the body and since normal daily activities and many specialized activities depend upon normal function of the knee joint, surgery in this area must be carefully considered from the viewpoint of the particular patient, his occupation and his age, and the skill of the operating surgeon. The indications for surgery around the knee joint will vary greatly depending upon the type of pathologic change as well as upon the factors listed above. There are also specific contraindications for surgery around the knee, depending upon the above factors. The indications for surgery may be considered under the headings of trauma, infection, congenital deformities, static deformities, paralytic deformities, tumors, and unclassified conditions. Only traumatic conditions will be considered in this paper.

FRACTURES

Frequently fractures in the region of the knee require open operation. Surgery is indicated chiefly to restore normal joint surfaces and normal joint alignment so as to permit the most normal function possible following fracture healing.

Fractures of the patella without displacement require only immobilization in a plaster cast. A full circular cast is preferred extending from the upper thigh down to just above the malleoli. In some cases it is desirable to continue the cast to include the ankle and foot. If the cast does not go below the malleoli, care must be taken to pad the lower end of the cast sufficiently so that it does not rub upon the malleoli or upon the Achilles tendon. It is my custom to partially suspend the cast from the skin of the leg by attaching mole-skin tape to the skin and incorporating it into the cast.

Fractures of the patella require surgical intervention when there is any separation of fragments. The usual procedure is to open the joint and irrigate it with saline, repair any torn joint capsule, repair the patella with wire, and close the wound. Then a full circular plaster cast is applied in the same manner as described above and extended to include the ankle and foot. Occasionally the patella may have to be excised in grossly comminuted fractures.

Fractures of the upper end of the tibia without displacement or depression of the plateau require only casting with the knee slightly flexed. In these cases the cast should always extend down to include the ankle and foot, the ankle being placed at a right angle to the foot. The patient should be kept on crutches, and a walking type cast should never be used. Because of the possibility of deformity occurring if weight bearing is begun too soon, immobilization must be continued until x-rays indicate that healing is complete.

Fractures of the upper end of the tibia involving depression of the tibial plateau require open reduction for restoration of the joint surfaces and for restoration of the alignment of the knee joint. These frac-

tures are commonly known as T and Y fractures of the tibia. They are also frequently called "bumper fractures." Even fractures of one condyle are frequently displaced downward and backward and require elevation into normal position. The technic generally involves opening and cleansing the knee joint with saline, chiefly so that the semilunar cartilage on the involved side may be inspected. If this cartilage is loose or torn it is best to excise it at this time. The depressed portion of bone is then elevated into position and held in position by means of a tibial bolt or a long bonescrew. Frequently the defect which is caused by raising the depressed portion into proper position is filled in by a bone graft. This may be obtained from the tibial crest just below the tubercle. Bank bone may also be used. Occasionally surgery is indicated in fractures of the upper portion of the tibia just below the condyle. If there is angulation of the proximal fragments, producing malalignment of the knee joint, open reduction and fixation with some type of plate or nail is indicated. Occasionally closed reduction will suffice.

Fractures of the lower end of the femur of the T and Y types, of the supracondylar area, and those involving only one condyle may frequently require open reduction if they are displaced. If they are not displaced, only casting is necessary. Displaced fractures of this type will tax the ingenuity of the best orthopedic surgeon. There are many methods for reduction and immobilization, although the number of methods indicates that none is too satisfactory. I have used skeletal traction with Steinmann pins, external skeletal fixation with the external splint bridging the knee joints, bolts, and screws. It is only by open reduction that many of these fractures can be accurately repositioned so that normal knee joint function will result. In most cases this type of fracture will require a hip spica cast for at least 3 to 4 weeks. Following this a long leg cast may be used.

Epiphyseal fractures at the lower end of the femur and the upper end of the tibia require either open or closed reduction if there is any displacement involving the epiphyseal line. Accurate replacement of the epiphysis is essential to normal growth of the bone and to future normal function of the knee joint. Internal fixation is avoided. If epiphyseal-type fractures in this area are not correctly handled a genu varum or a genu valgum type of deformity may result. I wish to point out that in the aftercare of all of these fractures involving the knee, osteopathic manipulative treatment plays an important role. This therapy includes treatment to the knee area itself and to the low back. It must be emphasized, however, that the most important factor in preserving muscle strength of the leg and in recovery of normal function of the knee is active exercise, chiefly of the quadriceps muscles.

DISLOCATIONS

Dislocations of the patella generally do not require surgery unless they are recurrent. Recurrent dislocations are generally of a congenital type. Surgery is aimed at reconstruction of the collateral ligaments of the joint so as to prevent future dislocation of the patella. Dislocation of the knee joint itself is rare, but when it occurs it may frequently require open reduction for accurate repositioning of the bones and for proper evaluation and repair of the soft tissue injury.

MUSCLE RUPTURES

In trauma to the knee joint involving rupture of the quadriceps tendon or the patellar ligament, surgical repair is frequently indicated. Many cases will respond to 2 to 3 weeks of immobilization in a circular plaster cast. If it appears that there has been a gross amount of soft tissue injury to the joint, it is probably best to recommend initial surgery for repair of the tendon or ligament. Many times these injuries will simulate a fracture of the patella. Occasionally there may be rupture of some of the muscles around the knee joint other than the quadriceps but these are rare.

RUPTURE OF LIGAMENTS

The majority of ligament ruptures or sprains involving the medial and lateral ligaments of the knee joint respond satisfactorily to a period of immobilization. A cast may be used in the more severe ruptures. Adhesive taping is generally sufficient in the majority of cases. Many will recover faster with x-ray therapy. Ethyl chloride spray is often beneficial in milder sprains involving the knee.

Occasionally a severe rupture of the medial or lateral ligament does not heal and surgical repair is required. Ruptures of the cruciate ligaments frequently require open operation and repair. This is especially true if they are not recognized early and are not properly immobilized.

INTERNAL DERANGEMENT OF THE MENISCI

Tears of the semilunar cartilages, either medial or lateral, or a loose semilunar cartilage where it has been torn from its attachment to the tibia often do not require open operation if they are seen early and are properly handled. In general, a torn or slipped semilunar cartilage should be replaced by manipulation. Reduction involves chiefly gaping one side of the joint with the joint in slight flexion at which time the cartilage can generally be replaced by thumb pressure. Following this, immobilization should be obtained with good adhesive tape strapping and preferably, in many cases, by means of a plaster cast for 2 to 3 weeks. Even in the more painful of these injuries reduction may frequently be carried out by using ethyl chloride spray instead of a general anesthetic.

In recurrent cartilage-type injuries, surgical intervention offers much hope for return of normal function to the knee joint. Conservative measures should be used first. They include placing medial wedges to the heels of shoes to take some of the strain off the medial aspect of the joint, wearing an elastic knee support and cage knee brace. I generally do not recommend surgery for cartilage-type knee injuries unless the patient has had several recurrences of a slipped semilunar cartilage with rather severe pain and locking of the joint. If the patient can get along in his daily activities without the cartilage slipping, surgery is not indicated. If he is continually having trouble with the cartilage, or if he wishes to participate in activities which throw strain upon the knee joint, surgery is indicated.

Generally arthrotomy is performed with excision of the involved semilunar cartilage in so far as possible. The space formerly occupied by the cartilage fills in with scar tissue. It has been found at subsequent operations and at autopsy that this new scar tissue greatly simulates the original knee cartilage and frequently there is no loss or thinning of the joint space. There should be no fear of knee joint surgery

providing the technic is accurately carried out and aftercare is adequate. Many of the bad results reported following knee joint surgery are because of poor aftercare, especially failure to give proper manipulative treatments and to prescribe proper exercise.

WOUNDS

When wounds of the knee joint occur arthrotomy should be performed with thorough cleansing of the joint and repair of the joint capsule. This is especially true if there are foreign bodies in the joint. A wound opening into the knee joint should not be treated in the office. It is a major surgical procedure.

CONTRAINDICATIONS TO SURGERY OF THE KNEE

Surgery of the knee is contraindicated in the presence of acute tuberculosis, syphilis, and recent infection. It is often contraindicated in arthritic cases unless the patient is fully evaluated beforehand. Obesity must be considered. In general, the older the patient, the more consideration must be given to all factors before a knee operation is performed.

RECONSTRUCTION PROCEDURES

Occasionally following old trauma, there will be arthritic changes, malalignment in the joint, or adhesion formation. This will necessitate some type of reconstructive surgery. Sometimes manipulation of the knee under general anesthesia will produce much benefit. However, it will in most cases not be nearly so beneficial as ordinary active exercise.

If there is deformity or arthritic change in the joint it will be necessary for the orthopedic surgeon to decide between arthrodesis and arthroplasty, and the choice will depend upon the conditions of the particular case. Quadricepsplasty is frequently indicated following injuries in which adhesions of the quadriceps tendon to the femur prevent normal flexion and extension of the joint. Occasionally, this type of case will require quadriceps lengthening. Reconstruction procedures around the knee are not to be taken lightly. There are many technical difficulties and frequent complications of this type of surgery. Prior to surgery the patient must be thoroughly evaluated and thoroughly acquainted with the aftercare and management.

SUMMARY

1. The indications for surgical management of knee injuries have been considered.

2. The general management of these injuries has been outlined.

3. It has been emphasized that the particular technic of surgery is only one aspect of the care and that aftercare is important and includes active exercise, osteopathic manipulative management, and associated physical therapy.

701 Salem Ave.

Evaluation of Drugs in Hypertension

ELIAS E. ZIRUL, A.B., D.O.
Kansas City, Mo.

Until the last decade the medical management of hypertension was largely empiric. Sedation, usually in the form of barbiturates, formed the basic therapy. Vasodilators, usually in the form of nitrates, were used widely. At one time thiocyanates enjoyed a fairly wide popularity, but their inherent toxicity ultimately resulted in their abandonment by the majority of clinicians.

The last decade has produced a marked change in this picture, primarily because of two major developments. The first has been a wide increase in knowledge of the etiology of hypertension. Keeping pace with this increase in fundamental knowledge of hypertension has been the development of a large number of effective hypotensive agents. Thus rational therapeutic measures have kept well abreast of increasing knowledge of this all too common disease.

Based upon our present knowledge of the physiologic and psychologic factors in clinical hypertension, it is possible to evolve a working concept of the pathogenesis of the disease. The steps involved in the development of full-blown essential hypertension may be as follows:

1. Psychosomatic factors are etiologically important in many cases of hypertension.

2. Such psychosomatic factors produce imbalance in the hypothalamus, causing relative sympathetic overactivity. (This intermittent or constant sympathetic overactivity results in generalized vasoconstriction.)

3. Renal ischemia is also produced which, in turn, may lead to the production of circulatory pressor substances.

4. Sustained hypertension leads to pathologic changes in the walls of the arteries, notably those of the kidney; this in turn leads to organic renal ischemia, and a vicious cycle is thus established.

On the basis of this concept, a rational therapeutic approach to hypertension might be postulated:

1. The use of sedatives and/or mild, centrally acting hypotensive drugs in the early, milder, and labile cases of hypertension.

2. In the more severe cases, two approaches are indicated. These are the use of agents that can block the neurogenic sympathetic influences and the use of agents capable of inactivating the pressor substances in the blood.

While the tendency in recent years has been to use drugs separately, the present appreciation of the complex etiology of hypertension has established the rationale of combination therapy in the major portion of these cases.

USEFUL DRUGS IN HYPERTENSION

Rauwolfia serpentina.—

While this drug has been used in India for many centuries, it has been used in this country for only about three years. In this short time it has met with a wide acceptance as an effective therapeutic agent in hypertension. A purified alkaloid fraction, designated as the alseroxylon fraction (Rauwiloid, Riker Laboratories) is widely used and, in my experience, has proved satisfactory.

The site of action of the drug seems to be the hypothalamus, and most of the pharmacologic actions of the drug are explainable upon the basis of hypothalamic depression with reduction of sympathetic dominance. The actions of Rauwolfia may be characterized as follows: (1) It is slow in action and moderately hypotensive, (2) it is bradycardic, and (3) it has a mild sedative action.

The drug is remarkably free from toxicity. The side actions, when seen, are usually limited to nasal congestion, gain in weight, and, infrequently, nightmares. Undesirable gastrointestinal side actions are very rare, although in some patients a mild softening of the stool, without change in bowel habit, may be observed. Freedom from nausea and vomiting is an outstanding advantage.

Objective improvement develops slowly while subjective improvement is usually prompt. It may take several weeks before the full therapeutic effect is reached. The average dose of the alkaloid extract Rauwiloid is 4 mg. daily, usually administered at bedtime. Increasing this dose does not increase the hypotensive effect. At this dose level side actions are extremely rare. The moderate hypotensive action, the moderate bradycardic action, and the mild sedative action make Rauwiloid very useful in younger patients. Rauwiloid is most useful in the mild, labile, or neurogenic type of hypertension. Rauwiloid alone is not very useful in the more advanced types of hypertension, but it does provide a very useful adjunct to more potent agents in the management of such cases.[1-5]

Veratrum viride.—

This is another old-time drug that has returned to favor in recent years. I use the standardized alkaloid extract, alkavervir (Veriloid, Riker Laboratories). The protoveratrines which are available are actually mixtures of alkaloids and appear to have no advantage over the alkavervir fraction.

Veratrum acts centrally, and it is a potent central vasodilator. It produces bradycardia through reflex (vagal) action, while cardiac output is maintained. Cerebral blood flow and renal function are also maintained within physiologic limits.

Side actions, in the order of their appearance, consist of epigastric burning, sialorrhea, and nausea and/or vomiting. These are uncomfortable but not dangerous. The dosage must be individualized to meet the requirements of the patient; in general 2 to 3 mg. (as Veriloid) four times a day will produce an adequate hypotensive effect. The drug can be continued indefinitely without deleterious effects. Veriloid alone is very effective in early essential hypertension. In more advanced cases it may be difficult to administer adequate dosage without the occurrence of side actions. In such cases Veriloid plus Rauwiloid is effective. The addition of Rauwiloid to Veriloid reduces the amount of Veriloid required, and thus reduces side actions. In addition there is apparent potentiation of action when the drugs are administered together.[6-10]

Hydralazine hydrochloride (1-Hydrazinophthalazine hydrochloride).—

Hydralazine hydrochloride (Apresoline Hydrochloride, Ciba) is a synthetic chemical compound; its primary action is that of a central adrenergic blocking agent. It produces peripheral, notably renal, vasodilatation. There is also some evidence that hydralazine neutralizes certain circulating pressor substances, such as pherentasin and angiotonin. Hydralazine increases renal blood flow and probably also cerebral blood flow; the increases are apparently related to an increased cardiac output. However, the drug has many objectionable side actions, and, according to recent evidence, potentially dangerous organ toxicity.[11,12] Among these are tachycardia (palpitation) and severe headaches. It may also cause angina in patients with arteriosclerotic heart disease, polyarthritis, drug fever, agranulocytosis, and a lupus erythematosus-like syndrome.

Because of the tachycardia and other distressing side actions, hydralazine is seldom used alone. Since both Veriloid and Rauwiloid are bradycrotic, either or both of these are usually combined with hydralazine hydrochloride. Since hydralazine has the ability to increase the renal blood flow and to antagonize certain pressor substances in the blood, its chief use is in malignant hypertension. It is best administered orally, starting with 25 mg. four times daily, increasing this dose gradually. The maximum dose should not exceed 200 mg. four times daily.[13-16]

Hexamethonium.—

Hexamethonium is a synthetic compound which exerts an autonomic ganglion-blocking action. This effect is exerted by raising the threshold of the sympathetic and parasympathetic ganglion cells to acetylcholine. Such an action is highly specific and, accordingly, potentially dangerous, since it can cause a profound fall in blood pressure. This drug must be used cautiously, because:

1. Rapid reduction of long-standing hypertension may diminish blood flow through vital organs.

2. Sudden withdrawal of the drug, especially from patients in malignant stages of hypertension, results in sudden return of high blood pressure with the risk of vascular accidents.

3. There is a wide variation in individual response for each patient.

4. Owing to the blocking effect, postural hypotension poses a problem.

It has been found that the 10-carbon homolog of hexamethonium, decamethonium bromide (Syncurine, Burroughs-Wellcome), has a powerful curare-like action, blocking the myoneural junction. On the other hand, the 5-carbon and 6-carbon homologs (hexamethonium) do not block the myoneural junction, but do inhibit transmission of nervous impulses through the autonomic ganglia of the sympathetic systems, as described previously. Unfortunately, their action upon parasympathetic impulses is undesirable, resulting in inhibition of intestinal peristalsis, inhibition of gastric secretion and motility, and possible urinary retention.

When used alone, hexamethonium usually results in converting a sustained hypertension to a fluctuating one. It is unsatisfactory in controlling the more severe cases. It does not produce sustained normotension, and, furthermore, tolerance is apt to develop. Therefore, if hexamethonium is used, it is better when used in combination with other drugs.[17-22]

Recent evidence indicates that administration of Rauwiloid with hexamethonium (Riker Laboratories) can reduce materially the side actions from hexamethonium. The patient's responses are stabilized under the combined therapy, and management is greatly simplified. Rauwiloid also seems to increase the ef-

fectiveness of hexamethonium, as evidenced by the fact that comparable lowering of the blood pressure is induced with substantially smaller dosage.[5,23]

DISCUSSION

It is trite to say that adequate and proper management of hypertension presents a difficult problem. While the newer effective agents have greatly improved the quality of results obtained, they have likewise complicated the problems of therapy. These newer agents, when used skillfully, will almost invariably relieve the symptoms of hypertension, and frequently the hypertension itself is benefited. But the attending physician must always be vigilant; he must beware lest he create, by injudicious therapy, a disease more serious than that which he is treating.

When presented with a patient who has hypertension, the problem is not whether the blood pressure can be lowered, but how much lowering is desirable. Like most physicians, I have older patients with systolic pressures of 160 to 180 and diastolic pressures of 90 to 110, and yet these patients are essentially symptom free. It is questionable whether very much good can be achieved by placing such patients on a regimen of hypotensive drugs. None of these drugs can be expected to reverse either arteriosclerotic vascular damage or organic renal disease. At the most, slowing of the process can be expected.

OUTLINE OF TREATMENT

1. Simple, essential hypertension, especially in younger patients who present symptoms of nervousness, headache, and tachycardia, and systolic pressure of approximately 180 to 190 with negative eyeground studies and no albuminuria, is usually amenable to Rauwiloid, 2 mg. once or twice per day. The patient is asked to return in 1 to 2 weeks. At that time the blood pressure is checked, general questions about the patient's condition are asked, and osteopathic manipulative therapy is usually given. In labile hypertension, associated with daily emotional strain, phenobarbital (15 mg.) three times per day is sometimes added. Usually a mild case will respond to this therapy at least to the extent of relief of nervousness and headaches.

Since the full effect of Rauwiloid develops slowly, at least 4 weeks of therapy should elapse before evaluation is attempted.

2. In more severe cases, or cases which do not respond to the above regimen, the medication is changed to Veriloid, usually 2 mg. four times per day. In some instances, the patient may be given a combination of Rauwiloid and Veriloid (Riker Laboratories) on a four-times-a-day basis. It is not wise to expect immediate decreases in blood pressure or relief of symptoms from the above regimens. Each should be given a trial of at least 4 weeks unless the patient's symptoms become worse in the interim.

3. In patients who have been exhibiting persistent severe hypertension or who show progressive damage to the heart, kidneys, or optic fundi due to hypertension, a more ambitious drug therapy is warranted. When it is felt that a reduction in pressure can cause a favorable change in the signs and symptoms, a combination of drugs is used. Hyphex therapy (the word is formed from *hy*drazino*ph*thalazine and he*x*amethonium) has, until recently, been the treatment I preferred. However, in view of the recent evidence of toxicity from prolonged use of this program,[11,12] I am now inclined to use hexamethonium in combination with Rauwiloid.

It is preferable that, whenever possible, all patients placed on hexamethonium therapy be hospitalized. Thus blood pressure can be observed adequately, renal and cardiac function can be checked, and any deleterious side effects can be watched for. Normotension may be an ideal, but it usually involves too radical a drop in pressure. In patients with organic damage, this can have serious results, due, essentially, to the cerebral and renal ischemia which can result from a too great or rapid fall in the pressure head supplying the circulation to these organs.

The dosage of hexamethonium usually given in benign hypertension is as follows:

First day	125 mg.	every 8 hours
Second day	125 mg.	every 4 hours
Third day	250 mg.	every 4 hours
Fourth day	375 mg.	every 4 hours
Fifth day	500 mg.	every 4 hours

Naturally, the establishment of normotension would interrupt this schedule at any time.

Previously on the fifth or sixth day we frequently added hydralazine to the regimen, starting with 25 mg. daily, every 4 hours, increasing 25 mg. daily every 4 hours until 100 mg. is given every 4 hours.

However, the use of hydralazine is not without serious hazards. Grimson and his coworkers[24] have warned that hyphex should be used with great caution, if at all, in patients with encephalopathy, damaged myocardium, or markedly diminished renal function. Schroeder[25] has warned that fatal reactions have followed its use, and the therapy should never be used to reverse abnormal blood pressure readings without other signs of disease. The risk of toxic actions from hydralazine, that is, drug fever, agranulocytosis, arthritis, and lupus erythematosus, has been cited by Maison.[26] Fatal reactions to hydralazine have been reported by Cohen;[27] psychoses due to the therapy have been reported by Moser and his associates,[28] and rheumatic and febrile reactions to the drug have been reported by Dustan and those working with him.[11] In a most recent report, Perry and Schroeder[12] reported that hydralazine caused collagen disease in various degrees of severity in seventeen of 211 patients, but that the condition usually regressed when the drug was withdrawn.

Ford and Mayer[5,23] have demonstrated the safety and efficacy of combined Rauwiloid and hexamethonium therapy in severe, intractable hypertension. Their data indicate that when the two drugs are given together the side actions from hexamethonium are reduced, the patient's responses are stabilized, and the management of these severe cases is simplified. In view of the inherent dangers of hydralazine therapy, I tend more and more to depend upon the combination of Rauwiloid and hexamethonium in these severe cases. It is a potent therapy and must be administered carefully with close supervision of the patient at all times. The dosage of hexamethonium must be adjusted individually to each patient. Considerable variation in the amount of the drug required to produce a desired hypotensive effect occurs from patient to patient. Once the dosage is stabilized, the dangers are lessened, but constipation must always be closely watched for.

Because of parasympathetic blockade, constipation and urinary retention may become a problem. In order

to prevent the former, some laxative is used at bedtime, such as milk of magnesia or Phospho-soda. Cascara is preferred by some investigators. Though the mild peristaltic stimulation from Rauwiloid tends to prevent constipation in this combined program, careful attention to the patient's bowel habits is still essential.

In cases of malignant hypertension, the pressure should be reduced slowly, particularly when nitrogen retention is present.[29] In these cases, an attempt to arrive at a normotensive state is inadvisable; thus a compromise is made to keep the pressure just above renal filtration levels. Since hexamethonium is excreted by the kidneys, anuria may cause a toxic retention of the drug. Hydralazine and hexamethonium should not be given simultaneously in these cases. Severe hypotensive crises may occur, leading to thromboses, renal shutdown, and death.

A few days before the patient is discharged from the hospital, the 2 a.m. and 4 a.m. doses are discontinued. The patient is warned never to discontinue the drug suddenly; if he does a hypertensive crisis may occur. Slow withdrawal is preferred. The blood pressure should then be checked daily.

In acute hypertensive episodes, with encephalopathy or left ventricular failure, either hexamethonium or Veriloid, as parenteral medication, is very dramatic in its action. Hexamethonium is given either subcutaneously or intravenously, with an initial dose of 2 mg. of the ion. It is then repeated every hour until the desired level is reached, that is, a fall from 300 systolic to about 210. The pressure may then be maintained with subsequent subcutaneous doses as required. Some observers recommend the use of parenteral hydralazine as adjunctive therapy with hexamethonium.

I have obtained excellent results in treating acute hypertensive episodes with intravenous infusions of Veriloid. The dosage is administered according to the patient's weight (0.15 cc. per 10 lbs. of body weight, diluted to 10 cc. in normal saline). It is given intravenously slowly (½ cc. per minute), and blood pressure is checked every minute. The objective is to lower the pressure slowly. The manufacturers of Veriloid recommend a range of 150/100, although this may be too low. Probably a range of 190/200 systolic would be safer and still give the clinical results desired. Once the desired level is attained, it may be maintained with intramuscular Veriloid and, later, with appropriate oral medication.

Inasmuch as parenteral Veriloid is a potent therapy in hypertensive crises and does not have the elements of danger associated with either hexamethonium alone or hyphex, it has become widely used in malignant hypertension, hypertensive crises, toxemia of pregnancy, pre-eclampsia, and eclampsia.

SUMMARY

1. The objective in treating hypertension is not necessarily the production of normotension but the achievement of blood pressure levels that are compatible with good health. All too frequently patients who have carried elevated blood pressures for many years are unable to tolerate so-called normal blood pressures with any degree of comfort.

2. The development of new and rational hypotensive agents has provided the clinician with an armamentarium that enables him to approach the problem of hypertension more intelligently. On the basis of the severity of the situation with which he is confronted, the physician is enabled to choose a drug or combination of drugs best suited to meet the needs of the individual patient.

3. Medical therapy for hypertension is still empiric. However, until the etiology of hypertension is understood more clearly and appropriate therapeutic aids are available, a program as outlined above offers the greatest promise available today for the hypertensive patient.

Lakeside Hospital
2801 Flora Ave.

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JOURNAL POLICY AND PRACTICE

How do the editors of THE JOURNAL determine what articles shall appear in it? Why do they publish articles that do not have an "osteopathic content"? Manuscripts often appear to get buried in the Central Office—is that a polite way of refusing to publish an article or is it due to sheer negligence? Are the editors afraid to publish material which is unorthodox or contrary to "medical" opinion?

These are the types of questions frequently brought to the attention of THE JOURNAL'S editors. They are not new in content. They seem reasonable questions; they have a justifiable basis in the questioner's mind; and usually they are rhetorical in nature, that is, the individuals who ask these questions do so with the implication that they know the answer. It seems advisable, therefore, to establish for the record the policy which does govern selection and publication of articles which appear month after month.

There are many factors which influence the acceptability of papers and determine their timing for publication. Certain of these factors are beyond the control of persons responsible for the make-up of THE JOURNAL. Chief among the uncontrollable factors is the increased demand for space. THE JOURNAL OF THE AMERICAN OSTEOPATHIC ASSOCIATION is the official scientific and clinical periodical of organized osteopathy. As such it has become an authoritative professional publication of high standards and is so accepted from without as well as within the profession. Articles which appear in it are given a certain prestige. Demands upon it for space are considerable.

The official status of THE JOURNAL requires the publication of certain material which is documentary in type and archival in nature. For example, readers will find that the 1953 and 1954 February issues carried the necessarily long and involved reports of the Advisory Board for Osteopathic Specialists. In 1955 and subsequently, the basic material of these reports will be republished with the minor alterations necessitated by a year's interval. The primary appeal of such copy is limited to those specialists concerned with organizational or teaching responsibilities; the reports will interest only the occasional general reader who prides himself on being informed of progress generally within his profession. This type of copy appears in THE JOURNAL, not primarily because of its value to special groups or selected individuals within the profession, but because of the requirements of certain agencies from without the profession—in some instances those of the Federal Government—for specific information in this particular form, obtained from the official publication of osteopathic medicine. Accrediting agencies and licensing bodies also must be supplied facts from the same source. Every month a portion of THE JOURNAL is taken up by reports of A.O.A. Departments and Bureaus (in small type only to conserve space), presenting our policy of organized osteopathy along a score of fronts, and in documentary form.

The "Manual of Procedure of the American Osteopathic Association," its official reference book, records that as early as July, 1933, the Board and House declared that osteopathy is and always has been a complete school of medicine. In the 20 years following this statement of policy, our profession has moved resolutely forward to its full implementation, resulting in considerable modification of the content of our publications. The policy of an unlimited independent school of practice was established uniquivocally and has been continued by the representatives of a democratically organized profession. The employed officers of the Association, of whom the Editor is one, work within this policy. Whether or not it is a wise one is no longer a matter of realistic debate so far as the editorial department is concerned. It is the responsibility of the Editor and his associates to follow the policy in all the publications of the Association.

This policy, moreover, is a powerful factor in increasing space demands upon THE JOURNAL. Every facet of medicine, sooner or later, is reflected in this monthly periodical. Budgetary limitations forces the editors to exercise a judicious space assignment, a relational timing of the appearance of papers, and a careful balancing of copy. The editors are aware that there are spots which THE JOURNAL does not cover and should, and yet they find any marked additional coverage at present both impractical and impossible.

Doctors on the profession's extreme "right" (in contradistinction to its "left" or "center") occasionally say that all JOURNAL copy should reflect the profession's distinctiveness, that all articles should emphasize an "osteopathic" point of view and name it as such. Some of these doctors deny that we always have been

"a complete school of medicine"—ignoring historical evidence to the contrary—or appear to accept the premise per se only to interpret it in a way not in accordance with its dictionary meaning. So to do is to fly in the face of a reality which they make no attempt to understand, leaving themselves and others whom they influence confused and uncertain. Like all organizations within the social body, whether they be of religion, of medicine, of education, or of politics, osteopathy is plagued by its own historic contradictions. Some of these contradictions are resolvable only in time. To be realistic is to accept the contradictions as inescapable and therefore to work as efficiently and understandingly as possible within the limitations they impose.

If the editors of THE JOURNAL had the space—and the added staff which additional space would entail—they believe they could do a much better balanced job in presenting the *distinctive* aspects of osteopathy, as well as those that are *classically* clinical and scientific. The editors are attempting to work understandingly and cooperatively with all segments of the osteopathic profession. Their efforts will be much more telling if all sectors moderate their special interests and commitments to special needs, and thereby help the department achieve the balanced unification which is so necessary in a publication widely representative of many interests.

Naturally, authors feel a sense of immediacy about the publication of their articles, an urgency readily understandable. The editors, however, must work on a planned program covering a year or more in advance. That does not mean that articles are scheduled a year before actual publication, but it does mean that articles must fit into a framework quite permanent in structure. Therefore, it is not possible to commit THE JOURNAL in advance to the publication of any article, or to give it a specific time assignment. When an article is found acceptable, its preparation for actual publication can be a considerable task, often involving months. A series of two special articles recently published in THE JOURNAL—excellent material—was delayed almost 2 years after its receipt. Back of this apparent delay lay a number of factors that made it impossible to start the series at an earlier date. At no time were the papers "buried" in the department.

Those who write for THE JOURNAL, and those who read it as well, should know that its editors are bound by a fundamental principle of policy which is a directive from the Board of Trustees of the American Osteopathic Association. It is a policy of positiveness, arising neither from timidity nor a slavish adherence to so-called orthodox or "medical" practice. It is a principle of publication adhered to by every scientific journal of authority and repute. This fundamental principle may be broken down in three parts, for the guidance of writers and editors alike.

1. All statements in scientific articles made as those of fact must be either admittedly generally available knowledge or they must be verifiable in acceptable sources of reference. If the statements are conclusions growing out of research, presentation of the research data must be made with customary scientific objectivity and be generally beyond criticism.

2. Observations made by an author and the conclusions that he draws therefrom remain in the realm of personal experience until they are tested by methods of scientific investigation and not proved false. Therefore, propositions or hypotheses so postulated must be presented and clearly identified as the author's own.

3. The language employed to record clinically observable facts or functions must be used in its dictionary sense, or within a meaning acceptable in current scientific literature. Personally coined terms should rarely be used, and never without justification. If coined terms are used, their meaning must be explained.

Adherence upon the part of THE JOURNAL to the fundamental principle outlined above is no new policy. It is one begun many years ago, and was stated forthrightly in the publication itself more than a decade ago when its editor wrote that medical writing appearing therein should stand up under the same scrutiny as that to which any scientific reporting is subjected. In this day and time the many broadly responsible are determined that there shall not be a scintilla of departure from this ideal. The purpose of this entire exposition is to clarify in the minds of its readers the policy and practice of THE JOURNAL, that they lend their full support toward making its ideal a month-to-month reality.

In addition to the fundamental principle of precise usage of scientific language, the editorial department follows a set of rules involving common procedures in capitalization, the use of italics, quotations, punctuation, and other technicalities of style. These are matters for editing and have nothing to do with the acceptability of a manuscript for publication. It would be useful for writers to have a guide, and the editorial department hopes soon to make available to those interested a statement of its own practice in the matter of style.

Occasionally, the editors find it advisable to submit a manuscript which they are considering to an acknowledged authority or authorities in the given field. In such cases, a copy of the manuscript, not identifiable with an author, is sent out for an objective appraisal.

Does the author have recourse from the workings of the editorial policy, as they apply generally and specifically to the publications? Yes. Appearing on the masthead of each periodical is the "Committee on Editorial Policy," a body responsible only to the Board of Trustees of the A.O.A. This has been an evolving committee which was made a permanent one by the Board in July, 1953; at the same time its sphere of action was broadened and its purpose clearly defined. For the membership, it constitutes an appeal board to which grievances may be brought against what are felt to be arbitrary and dictatorial policies. To the Editor and his associates, the Committee is one to

which they may go for consultation and guidance. It is actually a committee held in reserve, but one empowered to play an important jurisdictional role.

Every member of this profession with one accord would agree that the high purpose of organization is to accomplish that which leads to further growth and development of osteopathy. Therefore, there should be every possible opportunity for free expression and struggle, based on the premise that the democratic processes are vital to our existence as individuals and groups if we are to continue as a free world. These are issues bigger than any one person or group, hence the importance of such safeguards as the Committee on Editorial Policy in every facet of organizational life.

These policies and practices as outlined are set up to insure a periodical of high worth, of which osteopathic physicians may be rightly proud. Furthermore, they guarantee to the reader highly accurate, trustworthy information. There has been no attempt to rid osteopathy of its revolutionary impact, an impact it carries to a degree not yet fully appreciated by its proponents. But the position of osteopathy in the field of the healing arts is such as to demand that research and study done under its auspices shall be done within the confines of modern scientific methods and acceptable clinical standards of reporting. "Belief," however sincere and honest, has no legitimate role in medicine (or osteopathic medicine) today. No individual should be deprived of the right to validate his theories by means of publication. But publication in THE JOURNAL calls for the presentation of material in the terms of today's scientific methods and knowledge and not upon the basis of an author's enthusiasm.

The editors of THE JOURNAL acknowledge their fallibility, and gladly. For fallibility is a very human thing, a precious heritage of man, and a characteristic that insures to free men a free world. The failure of many men to confess it today is bringing all men everywhere close to the loss of that freedom. Opposed to fallibility is perfectionism, often glorified as a virtue but more often a deadly sin. For where it does not kill, it stifles. Born in preconceptions, it thrives upon instances and incidents. Editors generally welcome criticism, but no editor worth his salt will veer one degree from established policy and practice, no matter how wrong he may be in a single instance or incident, and wrong he will be upon occasion. The editors of THE JOURNAL know the course they pursue is a proverbial one, lying somewhere between the devil and the deep blue sea. And they will continue to ply it carefully, but boldly and fearlessly.

Through the growth and development of the policy and practices depicted herein, THE JOURNAL has moved forward well into its second half-century. Its continuity with the past remains inviolate for it sets forth today no higher purpose than so perfectly stated by its first editor in its first issue: "[To provide a medium] wherein the best thought and latest scientific research of the profession may not only find expression, but a place of permanent record."

ILLINOIS APPELLATE COURT ORDERS CHICAGO COLLEGE OF OSTEOPATHY APPROVED

On June 22, 1954, the Appellate Court of Illinois reversed a decision of the Medical Examining Committee of the Illinois Department of Registration and Education and ordered the Department to approve the application of the Chicago College of Osteopathy as a college whose graduates are permitted to take examinations conducted by the Department for a license to practice medicine in all its branches. The court stated:

> The professors who teach materia medica, therapeutics, surgery and theory and practice, are qualified teachers and the instruction at plaintiff's college [Chicago College of Osteopathy] compares favorably with the instruction given at Northwestern University Medical School. . . . We conclude, therefore, on the basis of the record in this case, that plaintiff conducts a college for the teaching of all branches of medicine and maintains the same high standards as do medical colleges approved by the Department of Registration and Education.

This decision should furnish a basis for a solution to the licensing problems which have harrassed the College and the profession in Illinois for a long period. They are to be commended for their perseverance in the face of what the court called an "unjust, arbitrary and discriminatory . . . enforcement of the rules." The decision in full is published on page 636.

MILTON MCKAY

"OSTEOPATHIC" VS. "MEDICAL" TEXTS

The third critique-like review to be made in recent years of a newly published osteopathic text will be found under "Book Notices" in this issue of THE JOURNAL. The volume, "Manual of Joint Manipulation," by Byron E. Laycock, D.O., professor of osteopathic principles and practice, Des Moines Still College of Osteopathy and Surgery, can be added to the short list of texts on manipulation which have appeared since the founding of the first osteopathic college more than 60 years ago. Even a complete bibliography comprising all authentic osteopathic texts would be scant.

The place and purpose of one particular type of osteopathic textbook is discussed in the review of the Laycock "Manual." This review attempts to examine the specific problem inherent in manuals on manipulative technics, the severe restrictions presented by their subject matter, their inherent shortcomings, and, consequently, their limited usefulness. Any attempt to evaluate a manual on manipulative technic without recognition of these factors renders the effort a cursory one.

The production of strictly "osteopathic" texts is destined to be limited, and rightly so. There are no good reasons for the publication of an osteopathic text that rehashes medical literature. Medical texts multiply endlessly, and although the quality of their teaching technics has greatly improved in the last quarter of a century, they do little to enhance medical wisdom. Revision of older texts too often makes them cumbersome to handle and adds little to their value, especially if the

revision merely adds new facts to a body of material, portions of which may be outdated and outmoded. New texts repeat the round. It is an inevitable process for there is a plethora of ambitious medical authors and a scarcity of original minds capable of creating new knowledge and able to reinterpret the past that it may be reborn to meet the needs of the present.

So highly developed are the skills of standard medical book publishers that the production of a salable book is readily accomplished, too often displacing a better book merely because of its appeal of newness, a situation found in America in the literary as well as the scientific field. The best medical literature today is often found in small monographs and in thought-provoking lectures made accessible in book form. In them are frequently expressed the questionings by creative minds of some phase of long-accepted but unproved medical thinking.

The heavy hand of the past has always laid itself upon medicine. Scientific advances, revolutionary at their outset, seem forever destined to become the most conservative influences. Their dynamic qualities lost, advances do not breed upon themselves, but die in a dogmatism that kills all further advance. Acknowledgedly, one of science's great triumphs was Virchow's formulation of cellular pathology, reaching its consummation in modern clinical-pathologic medicine. By this discovery, the seat of disease, as Osler put it, was removed from the tissues to the individual units, the cells. And since that time, men in medicine have been unable to think in any other way about disease. Virchow's creative thinking was stopped short by its embodiment in a formula: "Structural damage causes disturbed function." All of medicine fell under its shadow. No better example can be found than in the field of psychiatry, where it has given rise to the "organicists" referred to in the "Notes and Comments" section of the June JOURNAL.

The psychobiologists in the field of psychiatry have pretty well proved that the interplay of emotional forces (psychodynamics)—anxiety, danger, guilt, shame, pride, sex, love, et cetera—can affect the physiologic functioning of the organism, to the degree that these functional reactions will produce symptoms, and, further, that they can produce structural damage in tissue. "Stress" and the "strain" it entails, when applied to biologic science, arise from the impact of man on man. Stress is a factor of vast biologic significance because of the bodily changes it can produce. Thereby the formula "structural damage causes disturbed function" becomes conversely true. Apparently the distinction between function and structure has begun to resolve itself. Virchow is not controverted; he is emancipated.

The most recent interpretation and suggested reformulation of the osteopathic concept has emphasized that structure and function are reciprocally inter-related. The recognition of the role of the musculoskeletal lesion in health and disease was a scientific and revolutionary advance in medicine, given practicality by organized osteopathy. It tended, however, to become a mechanistic way of thinking, as dominating in its effect upon our profession as was the Virchow formulation in its effect upon allopathic medicine—a formulation which likewise negatively influenced and delimited osteopathic thinking.

It is quite likely that Virchow was much more dynamic in his understanding of causes and effects than his followers—"apostles" who turn creative thinking into dogma. Allopathic medicine has repeated this vicious practice of man in its dogmatism of the Koch concept of specific etiology. As Korr has rephrased an observation by Stieglitz: "In the allopathic view disease is equated with the pathogenic agent; disease is produced by the action of a given pathogenic agent, and is characteristic of that agent. In short, there are as many diseases or kinds of disease as there are 'etiologies.'" Old-school medicine has been so dominated by its mechanistic thinking that it has become fearful of thinking dynamically. Its fear of dogma, as its leaders term a philosophy of health and disease, has in itself become a dogma.

The emergence of osteopathy out of allopathic medicine, its growth, development, and achievement spanned by little more than 60 years reveals it to be a philosophy and an art and a science (i.e., as medicine is a "science"). Osteopathy is encompassed but not held in bonds by the osteopathic concept, for the concept is a terse statement of osteopathic philosophy, continually being restated, reformulated, reinterpreted in the light of advancing knowledge. As a continuing reformulation the osteopathic concept has successfully resisted efforts by small groups within the profession to limit it to a mechanized body of doctrine (philosophically speaking). Then, indeed, it would have become a "cult."

That osteopathic philosophy has so successfully withstood being made into a formula despite ceaseless efforts to dogmatize it or imprison it within the covers of a textbook, is ample proof of its dynamic qualities. Osteopathic medicine can be no more successfully contained within the covers of textbooks than it can be defined in "25 words or less."

THE JOURNAL recently was asked by a well-known midwestern medical textbook distributor for "a list of textbooks on osteopathy"—a logical enough request if one grants to any such questioner a total lack of appreciation of the historical position of osteopathy in the evolution of modern medicine. And such a question implies a need for "osteopathic" texts in the common usage of the term, a need that is nonexistent. An attempt to classify medical science texts into "medical" and "osteopathic" categories is entirely misleading and artificial in character.

Since this statement is not axiomatic it would ordinarily require an explanation to individuals

without the profession, and a defense from a small sector within the profession. Such an explanation, however, would necessitate an examination of the theory and practice of osteopathy since its inception, and thus far exceed the space available in these columns. But it can be said simply that medicine is a discipline of man and as such is one with theology, philosophy, law, and the sciences. It is a great body of knowledge, some of it outmoded, other portions in need of reinterpretation, and still others in need of being released from mechanized and binding concepts that prevent spokesmen of the old school of practice from encouraging a dynamic approach to the problem of health and disease. Modern medicine must be freed from its bonds as modern physics has been freed from the mechanized approach that characterized it at the time of World War I. Through its emancipation, modern physics brought in "the atomic age." Aside from the occasional original thinker in medical science, old-school medicine today is fettered; osteopathic medicine is only less fettered.

There needs to be no more rewriting of medical texts, no compounding by osteopathic authors of error sufficiently compounded. Such a statement, however, does not preclude the need for a periodical and monographic literature that presents a distinctive approach to the problems of health and disease as exemplified by osteopathic principles, i.e., by the osteopathic concept. When such a literature is produced it will come as a positive contribution to medical knowledge and in a scientifically acceptable manner.

There always has been a need—and it grows greater—for monographs which relate the musculoskeletal lesion to specific problems. There is now available an excellent text, entitled "Psychosomatic Approach to Gynecology and Obstetrics," that brings to bear upon that field the known facts of modern biology, physiology, and psychology. A similar approach to the problems of gynecology and obstetrics could be made which would take into account what is known of the effects of the musculoskeletal lesion in these two specialties of medicine. Although much remains unknown about the precise nature of the musculoskeletal lesion, there is enough known and practiced to justify such a monograph. This example could be multiplied many times.

There is a body of osteopathic literature of considerable value. Much of it is in periodicals of the past. Selected portions of osteopathic books have their peculiar value, and newer material of significant worth occasionally appears in current osteopathic publications. There is much valuable material "buried" that needs only re-evaluation and reinterpretation in the light of today's knowledge. The developing plans of the Committee on Clinical Studies bear a direct relation to this entire question of osteopathic publication.

There is need for a distinctive osteopathic literature, given wider circulation through monographs and essays and gaining prestige by the form in which it appears. It must be a literature that is not merely repetitive, but one that grows out of lucid minds working within scientific methods. As books, they must be as faultless as is the knowledge they present to discriminating readers.

Notes and Comments

A new method of wiping out the criminal black market in narcotics, of helping to cure addicts, and of bringing the entire flow of narcotics under federal and state control was recently suggested by Dr. Hubert S. Howe, a former clinical professor of neurology at the College of Physicians and Surgeons of Columbia University. Speaking before the annual meeting of the New York State Medical Society, he stated that the United States has the highest crime rate of any civilized country in the world and the largest black market in narcotic drugs. The neurologist doubts that addicts can be cured and proposed that narcotics should be made available by prescription to addicts in minimum doses at low prices from a few selected physicians. He stated that it takes at least $5,000 a year to keep an addict supplied through criminals. The Federal Bureau of Narcotics has estimated that the underworld revenue from the sale of narcotics in this country amounts to $275,000,000 a year. Dr. Howe also pointed out that the attraction for criminals is that a pound of heroin purchased for $500 to $1000 can be sold to addicts for a total of $384,000.

The Federal Narcotics Commissioner, Harry J. Anslinger, strongly disagreed with Dr. Howe's proposal, claiming that the practice of legalized addiction had been tried out in the early nineteen twenties but was abandoned when it was found that it led to increased addiction and crime.

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Within less than a decade atomic energy has entered into popular parlance. It is concerning hundreds of thousands of the population and seems destined to concern more and more. Three phases of atomic energy are of special importance to physicians. Of direct medical value is the external use of radiocobalt as a substitute for radium in the external and implantation treatment of tumors. Radiocobalt is used exactly as radium is and can be produced at about one-thousandth of the cost of radium. Three radioactive isotopes have acquired popularity for internal use. One of these is radioactive phosphorus, the treatment of choice in polycythemia vera. It is also useful in the treatment of ordinary types of chronic leukemia. Radioactive iodine has made possible an accurate diagnosis of the activity of the thyroid gland. It can also be used therapeutically in other ways. Radioactive gold can be injected

intraperitoneally or intrapleurally to control fluid formation due to metastatic growth. Another phase of atomic energy is applicable to industrial medicine and public health. As a business, atomic energy employs thousands of people. Utilization of fissionable material presents many real hazards to workmen or others subjected to exposure. These hazards are known and are being carefully provided for.

A third phase of atomic energy is the direct responsibility of the physician from the civil defense standpoint, that is, what the doctor needs to know to care for the victims of an atomic explosion or of enemy action. In this connection readers of THE JOURNAL are reminded of three significant articles which it has published recently. The November and December, 1953, issues contained a series of two articles on "Medical Aspects of the Atomic Explosion," by W. Kenneth Riland, D.O., of New York City, one of the physicians of the United States Steel Corporation. The material in the articles was a part of his course for civilian defense training of employees of U.S.S.C., and as such is applicable by other osteopathic physicians directing preparation for catastrophic situations. In February, 1954, THE JOURNAL published an article on the disaster plans of one osteopathic hospital, laying out a concrete program of action for any type of catastrophe but especially applicable to atomic disaster.

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Commissioners of Health for New York City and the State itself are discouraging widespread use of gamma globulin against poliomyelitis "because of lack of evidence that there was definite value in its use in 1953." They ruled against giving it to those who had been exposed to the disease in their homes because it "offered no protection" in such cases last year. They are, however, authorizing its use this year in circumstances involving a number of cases in large groups, such as summer camps and day nurseries. Gamma globulin will be available for persons under 40 years old in New York state who have to undergo throat operations that cannot be postponed until after the June-October polio season. Authorities emphasize that gamma globulin, although inadequate as a polio preventive, has proved highly effective in preventing measles and infectious hepatitis.

More than 400 doctors from all over the United States, Canada, Mexico, and Western Europe attended the Sixth Annual Meeting of the International Academy of Proctology, in Chicago. Included among those in attendance were a number of osteopathic physicians. Important papers on rectal and colon carcinoma, indiscriminate use of antibiotics, prolonged use of cathartics, and pain management were presented at the convention. There was a premier presentation of 3-D stereoscopic films on ambulatory proctology and office surgery, the first of this type of motion picture of ambulatory rectal surgery to be shown at any medical convention.

Dr. Alfred J. Canton, Flushing, N.Y., who has been re-elected successively as the secretary of the organization since its formation in 1948, is the founder of the Academy. Dr. Cantor is also editor of the *American Journal of Proctology*.

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A strengthened research attack on cancer through chemotherapy is being made through grants-in-aid to scientists in universities and medical centers for research projects, according to announcements recently made by Surgeon General Leonard A. Scheele of the Public Health Service, U.S. Department of Health, Education, and Welfare. The possibilities of effective treatment of cancer through chemical agents have not yet been exhausted. These grants are distinct from the cancer teaching grants made to all osteopathic colleges and some medical schools. Osteopathic cancer co-ordinators report a progressive development of their program.

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Urologists in attendance at the forty-ninth annual meeting of the American Urological Association were told of promising results in the treatment of renal tuberculosis from the combination of 1 gram of streptomycin twice weekly and 100 milligrams of isoniazid three times a day for a year. Simultaneous use of the two drugs was shown to defer the development of drug resistance. This report was made by Dr. John K. Lattimer of the Columbia Presbyterian Hospital Urological Clinic. Dr. Lattimer, pointing out that renal tuberculosis developed in 4 per cent of patients suffering from pulmonary tuberculosis, urged urinalyses every 6 months for 10 years after lung infection to detect possible spread of the disease. He urged similar testing following bone tuberculosis.

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By a newly established regulation the Commissioners of the District of Columbia have made it possible for medical research to obtain from the Washington pound otherwise doomed animals. The new District regulation was bitterly fought by antivivisection groups and by the American Humane Association. More than 100,000 letters from all over the United States poured into the offices of the Commissioners and of members of Congress, many writers being under the impression that the new regulation was a bill under debate in the Congress of the United States.

The Commissioners were presented with official statements from eight-six national scientific and health organizations and sixty-nine medical colleges. The statements were contained in two bound volumes. Among the groups urging adoption of the measure were: American Hospital Association, American Cancer Society, American Physiological Society, American Society of Professional Biologists, National Society for the Prevention of Blindness, National Science Teachers Association, and the American Medical Association. In support of the regulation, the American Society of Anesthesiologists emphasized that "Were it not for animal studies, the advent of the art and

science of modern anesthesia would have been set back a generation or two." The American Veterinary Medical Association pointed out that "Much of the research carried out on animals, particularly dogs, is of direct benefit to the dog." As a result of the victory made by the friends of medical progress, the District of Columbia joins the medical centers of the United States which saved doomed animals for service in furthering medical progress.

Letters from antivivisectionists which pour in during such hearings as were held by the Washington Commissioners present in many instances uniformly vivid evidence of an underlying viciousness. One wrote, "I hope you will suffer the agonies of the damned"; another expressed the wish the reader of the letter would have his neck broken "before a month has passed"; and a third suggested that "One of your arms ought to be pulled off."

Psychiatrists point out that antivivisectionists manifest hysterical symptoms which represent an attempt to express indirectly, or in a disguised, symbolic form, an individual's repressed, unconscious impulses. As a result, the antivivisectionist's attention is focused upon violence. He talks and writes of horrible deeds, deeds that he hopes will be committed against the "vivisectors."

That is not to say that there are not many fine, genuinely kind persons in the humane movement. These persons in contrast seem concerned in making life more pleasant for all kinds of creatures. At the top of this list, in reality heading all lists of men in their most highly civilized aspects, would be Albert Schweitzer with his world philosophy of "reverence of life." Responsible human leaders are compassionate toward all creatures.

Osteopathic physicians who have patients interested in the humane movement should acquaint them with the work of the National Society for Medical Research and especially suggest that they read the organization's bimonthly *Bulletin for Medical Research*, which is an interesting publication of information to laymen about the purposes and policies of medical research. The American Osteopathic Association holds membership in the N.S.M.R.

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A recent publication of the U.S. Public Health Service brings together information on chronic illness for the benefit of the Commission on Chronic Illness established in 1949. "Chronic Illness—Digests of Selected References, 1950-52," supplements Public Health Service Publication No. 10, and can be obtained from the Superintendent of Documents, Washington 25, D.C., price $1.00. The Supplement is a 262 page book abstracting the more recent literature which sets forth current plans and programs designed to combat the serious consequences of chronic conditions. . . . Another publication of the Public Health Service of value, "Management and Union Health and Medical Programs," can also be obtained from the Superintendent of Documents for $1.00. This volume explores the broad area of health and medical services in industry. Its emphasis is on the provision of medical care outside the plant, for the workers, and sometimes their families, under the sponsorship of employees' organizations or unions, or of management, or both. The volume will be of special interest to the Bureaus of Industrial and Institutional Service and Public Health and Safety, and to all osteopathic physicians aware of the necessity of the profession's wider acquaintance with the ever-widening field of industrial medicine.

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In Briefer Form.—Experience with the inoculation, now going on, of one and one half million children with the Salk vaccine for poliomyelitis will be presented at the eighty-second annual meeting of the American Public Health Association in Buffalo, October 11 to 15. . . . Recent testimony given before a House Appropriations subcommittee by Dr. W. H. Sebrell, Director of the National Institutes of Health, pointed out that diagnosis of cancer of the cervix at a very early stage had been so successful that it warrants the belief that medicine is on the road to conquering this type of malignancy. . . . The National Society for the Prevention of Blindness reports blindness among children of preschool age has increased 50 per cent between 1943 and 1950. About 96 per cent of blindness in this group occurred before the first birthday because of retrolental fibroplasia. Premature babies are especially liable to its attack. There are now more than 6,000 blind children in the United States under 7 years old. . . . The world's population increased by 25,000,000 in 1953 and is growing at the rate of about 70,000 a day. Large increases in the present production of foods and goods and vast improvement in distribution are essential before even today's population can be provided with a decent subsistence, in the opinion of the Population Reference Bureau. . . . New technics for liver surgery may result from studies reported to the annual meeting of the American Association of Anatomists. John E. Healey, Jr., M.D., Jefferson Medical College, was able to establish an anatomic pattern for vascular and bile circulation within the liver by means of injection of the bile ducts, hepatic arteries, and portal veins. He then follows the flow pattern. Surgeons have removed portions of the liver since 1886, but the operative procedures have remained relatively crude due to lack of knowledge of both blood and bile. . . . The anatomists were given a report on the finding of the earliest known specimen of human identical twin embryos. They were only 17 days old and were discovered in a uterus which had been removed during an operation. External measurements of the sac containing the twins was only ¼x½x¾ inches. Inside it the twins appeared to be normal and were attached about ¼ inch apart. The finding was reported by Dr. Chester H. Heuser of the Medical College of Georgia.

Department of Public Affairs

DONALD M. DONISTHORPE, D.O.
Chairman
Los Angeles

BUREAU OF PUBLIC EDUCATION ON HEALTH

HOBERT C. MOORE, D.O.
Chairman
Bay City, Mich.

ILLINOIS APPELLATE COURT ORDERS CHICAGO COLLEGE OF OSTEOPATHY APPROVED

APPELLATE COURT OF ILLINOIS
FIRST DISTRICT, SECOND DIVISION
June 22, 1954

CHICAGO COLLEGE OF OSTEOPATHY, a corporation,
Appellant,
v.
NOBLE J. PUFFER, as Director of the Department of Registration and Education of the State of Illinois,
Appellee.

Gen. No. 46,129
APPEAL FROM SUPERIOR COURT, COOK COUNTY

MR. JUSTICE ROBSON delivered the opinion of the court.

This is an action under the Administrative Review Act brought by the Chicago College of Osteopathy, plaintiff, to review a final administrative decision by Noble J. Puffer, as Director of the Department of Registration and Education, defendant (hereinafter called Department), denying plaintiff's application for approval as a college whose graduates are permitted to take examinations conducted by the Department for a license to practice medicine in all its branches. Vera M. Binks, now Director of the Department, was substituted as defendant by order of the trial court without change in the title of the cause. The trial court conducted a hearing on the record made before the Department and affirmed the decision of the Department. Plaintiff appealed from this order.

The first question that we must decide is a motion of the Department, which was taken with the case, to dismiss the appeal on the ground that plaintiff failed to join as parties defendant the members of the Medical Examining Committee. Defendant in support of its contention cites as directly in point the case of *Cuny v. Annunzio*, 411 Ill. 613. This involved an appeal from a judgment of the Superior Court of Cook County affirming a decision of the Board of Review of the Department of Labor which approved the findings of the deputy and referee of the Division of Unemployment Compensation. The sole defendant named in the complaint was the Director of Labor of the State of Illinois, and a review was sought of the decision of the Board of Review of that department. The Director moved to dismiss the appeal on the ground that appellant had failed to join as parties defendant the Board of Review. The plaintiff contended that while the Board of Review is an administrative agency, it is not independent of the Director but is in reality a division of the Department. The Supreme Court held that the Board of Review was a necessary party defendant on appeal saying, at p. 616:

> "The decision of the Board of Review in this cause terminates proceedings within the Department of Labor and review of the Board's decisions on matters pertaining to unemployment compensation lies only to the circuit court or superior court. (Ill. Rev. Stat. 1945, chap. 48, par. 230.) Thus, while the Board of Review may be a division or arm of the Department of Labor which operates under the superintendence of a Director, it is the Board which acted as the administrative agency and entered the administrative decision, and is the party contemplated by section 8 of the Administrative Review Act."

It is clear from this decision that the Board of Review was independent of the Director of Labor and could make final decisions. (Ill. Rev. Stat. 1945, chap. 127, par. 44a.) It is also provided in chapter 48, paragraph 230 of the Unemployment Compensation Act (Ill. Rev. Stat. 1945) that the Director or Board of Review, as the case may be, shall be competent to make "final administrative decisions" and that the "Board of Review or the Director, as the case may be, shall certify the record of the proceedings to the Circuit or Superior Court. . . .". (Cf. *Abbott Publishing Co. vs. Annunzio*, 414 Ill. 599.)

We have examined the comparable provisions of the Medical Practice Act (Ill. Rev. Stat. 1951, chap. 91) and we find no provision giving the Medical Examining Committee a like degree of independence of the Director of Registration and Education. The Department contends that paragraph 60a of the Civil Administrative Code (Ill. Rev. Stat. 1951, chap. 127, par. 60a) authorizes the Medical Examining Committee to function as an administrative agency within the purview of paragraph 8 of the Administrative Review Act (Ill. Rev. Stat. 1951, chap. 110, par. 271). Paragraph 8 reads:

> "In any action to review any final decision of an administrative agency, the administrative agency and all persons, other than the plaintiff, who were parties of record to the proceedings before the administrative agency shall be made defendants."

Paragraph 60a reads:

> "None of the functions, and duties enumerated in section 60 of this Act shall be exercised by the Department of Registration and Education except upon the action and report in writing of a committee which shall be composed of persons designated from time to time or as hereinafter set forth by the Director of Registration and Education to take such action and to make such report, for the respective professions, trades and occupations. . . ."

In our opinion paragraph 60a makes it clear that the Medical Examining Committee exercises no final decision-making powers. It is merely a fact finding body that makes recommendations in a report to the Director. *Bodenweiser v. Dep't of Registration*, 347 Ill. 115, 121; *Schireson v. Walsh*, 354 Ill. 40, 55; *Smith v. Dept. of Reg. & Education*, 412 Ill. 332, 333; and see, generally, 18 A.L.R. 2d 606 *et seq.* The director, though not possessing power to act without the Committee's recommendations, in his sole discretion decides whether the Committee's findings and recommendations shall be adopted by him and become final or the matter returned to the same committee or another for rehearing. (Ill. Rev. Stat. 1951, chap. 91, pars. 16b-1, 16d; chap. 127, pars. 60, 60a.) An appeal may be had to the circuit or superior courts only if he adopts the findings and recommendations of the Committee. This case is, therefore, clearly distinguishable from *Cuny v. Annunzio, supra*, where the action of the Board terminated the proceedings.

Prior to the Illinois Administrative Review Act of 1945, review of an administrative agency's decision was generally by way of the common-law writ of certiorari. (See, e.g., par. 17, Medical Practice Act, Laws 1923, p. 436; chap. 91, par. 16b, Smith-Hurd Ann. Stat.) By that procedure, many cases were on review prosecuted against the Director or the Department. (See e.g., *Schireson v. Walsh, supra; Bodenweiser v. Dep't of Registration, supra;* and see Ill. Rev. Stat. 1951, chap. 127, par. 4.) Return to the writ was made by the Director. (Cf. Ill. Rev. Stat. 1945, chap. 48, par. 230.) The Administrative Review Act of 1945 did not reorganize the sources of power and authority vested by other acts in the several offices or officers of any one department. It primarily effected uniform administrative review procedure and broader review on appeal from the administrative agency's final decisions. Under the Act, the Director of Registration and Education remains the official empowered to certify and file the record of administrative proceedings on appeal. (See Ill. Rev. Stat. 1951, chap. 91, par. 16b-3; chap. 127, par. 4; and cf. Ill. Rev. Stat. 1951, chap. 48, par. 520.)

We are of the opinion that the Medical Examining Committee is not a final decision-making body under paragraph 8 of the Administrative Review Act. Therefore its members were not necessary parties defendant in this proceeding. Defendant's motion to dismiss is denied.

The next question is whether the Department was lawfully justified in denying plaintiff's application. The decision of the Department was based upon its adoption of six findings of the Medical Examining Committee holding that the plaintiff had failed to comply with certain fixed rules and standards of the Department for approval as a medical college. These rules and standards were promulgated pursuant to Sections 19 and 20 of the Medical Practice Act of 1923. (Laws 1923, p. 436, Smith-Hurd Ann. Stat. chap. 91, secs. 16d and 16e.) For a proper understanding of this controversy, it is necessary to review some of its history.

The Medical Practice Act of 1899 was held unconstitutional because of its discriminatory provisions against osteopaths. *People v. Schaeffer*, 310 Ill. 574. The court said at p. 583:

> "This statute therefore tends to deprive the osteopaths of their constitutional right to practice surgery, who are, so far as this record shows, just as efficient and as well prepared by college and hospital training to practice surgery as are the physicians of the medical schools. The act is therefore void as to such physicians so deprived."

The same type of discrimination appeared in the Medical Practice Act of 1917, and that was held unconstitutional. *People v. Love*, 298 Ill. 304. In the case of *People v. Witte*, 315 Ill. 282, in which the Supreme Court had for consideration the constitutionality of the present Medical Practice Act, it said, construing the subsections of sections 19 and 20, at p. 292:

> "The first subsection of section 19 requires the department to make rules for establishing reasonable minimum standards of educational requirements to be observed by medical colleges, or by any professional school, college or institution teaching any system or method of treating human ailments, and to determine the reputability and good standing of all schools, colleges and institutions. By the twentieth section it is provided that the provisions of the act shall not be so construed as to discriminate against any system or method of treating human ailments, or against any medical college or any professional school, college or institution teaching any system or method of treating human ailments, on account of any such system or method which may

be taught or emphasized in such medical college or in any such professional school, college or institution. Hence the act requires the making of rules and regulations under which all examinations shall be conducted; it enjoins uniformity in examinations, so far as their nature will permit; it imposes the duty of making rules for establishing reasonable minimum standards of educational requirements, and it expressly prohibits discrimination against any system or method of treating human ailments or against any medical school or college whatever. The department is not permitted, under the act, arbitrarily to prescribe minimum standards of educational requirements nor conduct examinations of applicants for licenses according to its arbitrary whim or caprice. The rules and regulations promulgated by the department are subject to review by the courts to determine whether or not they are reasonable."

It is encumbent upon us on the basis of the record to determine whether the rules and regulations of the Department are fair; whether the plaintiff has substantially complied with these rules and regulations and whether discrimination has been practiced against it in the findings made by the Medical Examining Committee and in the approval of its findings by the Department.

The relevant parts of the lengthy record reveal the following: On May 19, 1949, plaintiff made its application and at the request of the Department submitted information to the Medical Examining Committee preliminary to a complete investigation of the hospital. Correspondence was had with the chairman of the Committee pertaining to it. An examination of the school was made by the Committee on October 20, 1949. A lengthy report was filed by plaintiff setting forth the organization, administration, property statement, equipment valuation, teaching plant, faculty, student enrollment and intern placement, as requested by the Committee. Later extensive supplemental information was furnished.

On April 3, 1950, the Medical Examining Committee unanimously recommended that the application of plaintiff be denied on six grounds. On April 12, 1950, in a letter signed by the defendant, the plaintiff was informed of the action of the Medical Examining Committee. On April 14, 1950, plaintiff appealed from the report of the Medical Examining Committee to the Department and asked for a rehearing. The rehearing was allowed and set for August 10, 1950, before the same Medical Examining Committee. Plaintiff introduced testimony of various individuals and filed numerous exhibits in support of its petition. The Department introduced no proof to controvert it and plaintiff's record, therefore, stands unchallenged.

The 1923 Medical Practice Act required the Department to make rules establishing reasonable minimum standards of educational requirements for colleges whose graduates would be permitted to take examinations under the Act. Yet twenty years after the passage of that act no such rules had been adopted by the Department. In 1941 a committee was appointed by the Illinois Osteopathic Association, which included the president of the plaintiff's Board of Trustees, to negotiate with the Department of Registration and Education for the purpose of seeing whether the Department would approve plaintiff so that its graduates would be permitted to take examinations for a license to practice medicine in all its branches. The Committee had many meetings with the then Director of Registration and Education and with the Medical Examining Committee of the Department and requested that rules be adopted as required by the Medical Practice Act so that plaintiff would know what would be required of it in order to secure approval by the Department. Plaintiff had been and is approved by the Department as a college whose graduates are permitted to take examinations for a license to treat human ailments without the use of drugs and without operative surgery. The Committee was not successful in getting the department to adopt rules.

In 1943 an original application for a writ of mandamus was presented to the Supreme Court of Illinois on the relation of the president of the Board of Trustees of plaintiff. The court allowed the motion for leave to file the petition. The Department promptly adopted rules as prayed for in the petition and filed them as a part of its answer to said petition. After the adoption of rules by the Department, the plaintiff in May, 1949, submitted its application to the Department for approval as a college whose graduates would be admitted to examinations for a license to practice medicine in all its branches.

Plaintiff was incorporated as a not-for-profit educational institution in the State of Illinois in 1913. Since 1918 it has owned one block of land in Chicago, Illinois, on which are located buildings containing classrooms, laboratories, library, outpatient department and a 100-bed hospital. It is affiliated for teaching purposes with the Detroit Osteopathic Hospital in Detroit, Michigan, which has 160 beds. Plaintiff's students in their senior year spend three months at the Detroit hospital where they receive instruction in surgery. Plaintiff has a faculty of 64 people of professorial rank; has 215 employees and operates on an annual budget of $700,000. Its educational program has been accepted by every state and federal agency to which it has applied with the exception of the State of Illinois. It teaches materia medica, therapeutics, surgery, obstetrics and theory and practice. These subjects parallel the instruction given in medical institutions in the method of presentation, scope, textbooks used, qualifications of instructors and clinical hours. Its graduates are permitted by the following states and other jurisdictions to take examinations for an unlimited license to practice medicine: Indiana, New Jersey, New York, Ohio, Wisconsin, Colorado, Connecticut, Delaware, District of Columbia, Kentucky, New Hampshire, Oregon, Rhode Island, South Dakota, Texas, Virginia, Wyoming, Arizona, California, Florida, Hawaii, Iowa, Maine, Michigan, Missouri, Nevada, New Mexico, Oklahoma, Pennsylvania, Tennessee, Utah, Vermont, Washington and West Virginia. The student enrollment for the year 1950-1951 was 242. Of 242 students graduated by plaintiff in the last ten years, 196 went to states where they were permitted to take examinations for an unlimited license and all of them passed the examinations for an unlimited license, eighty per cent passing on the first examination.

Two doctors who had no connection with plaintiff's institution testified on its behalf. The first was Dr. Eric Oldberg, who is head of the Department of Neurology and Neurological Surgery of the medical school of the University of Illinois, head of the service at the Illinois Neuropsychiatric Institute and Chief of Service of Neurology and Neurological Surgery at the Illinois Research and Educational Hospitals. He is one of the outstanding brain surgeons in the United States. He testified that he is familiar with the way hospitals are run and the way a teaching hospital should be operated. He said that plaintiff's hospital is one of the best hospitals of this type in Chicago and is run competently and efficiently. He further said that when plaintiff's hospital referred a patient to his office, the patient came to him with a very complete resume of all the history, findings and laboratory work, which was accurate and adequate, and that his impression of the hospital is excellent. He knew eight or ten of the doctors at plaintiff's hospital and he considered them competent. Doctor Charles Laury, who is a consultant at the Illinois Central Hospital, the Chicago Board of Health and also at plaintiff's hospital, testified substantially to the same effect as Dr. Oldberg.

The only colleges approved by the Department whose graduates are permitted to take examination for license to practice medicine in all its branches, or to receive a full license by reciprocity with another state, are those which grant the degree of Doctor of Medicine.

The first ground for denying plaintiff's application as stated by the Medical Examining Committee in its recommendations and approved by the Director in his decision reads as follows:

> "1. Rule 5 on page 3, entitled 'Premedical Education, College Preparatory,' among other things, provides for a minimum of 16 hours of Chemistry and 8 hours of English, while a review of the catalogue of the Chicago College of Osteopathy shows failure to meet that requirement, in that their minimum requirement is 12 hours of Chemistry and 6 hours of English."

The evidence shows that at the time plaintiff was inspected it required twelve hours of Chemistry and six hours of English, College Preparatory, as a minimum for entrance to the college and that since that time the requirements in Chemistry have been raised. This rule is not strictly enforced against medical colleges which grant the degree of Doctor of Medicine. Twenty-seven of such medical colleges of the eighty approved by the Department require only six hours of English, College Preparatory, as an entrance requirement. In the list are Northwestern University, Loyola University, University of Illinois, University of Michigan, University of Wisconsin, Ohio State, St. Louis University, Washington University, Stanford University and University of Southern California. Seventeen of the medical colleges of the eighty approved by the Department require less than 16 hours of Chemistry, College Preparatory, as an entrance requirement, including such colleges as New York University, St. Louis University, University of Nebraska, Vanderbilt University and Western Reserve University. More than one half of such medical colleges approved by the Department fails to meet the requirements of this rule.

The second ground for denying plaintiff's application reads as follows:

> "2. In Rule 7 on page 4, the Department rules require a minimum of 5119 didactic and laboratory hours for graduation. The said Chicago College of Osteopathy fails to meet that requirement, in that the minimum number of hours they require in didactic and laboratory instruction is 4872 hours."

The evidence shows that the minimum number of didactic and laboratory hours required by plaintiff for graduation is 4872. This rule is not enforced against medical colleges which grant the degree of Doctor of Medicine. Twenty-one of such medical colleges of the eighty approved by the Department require for graduation less than the number of hours provided in this rule, including Harvard University, Indiana University, Northwestern University, University of Michigan and University of Illinois.

The third ground for denying plaintiff's application reads as follows:

> "3. Under Section 5(a), 'Faculty Requirements,' the Department rules require a school to provide at least six expert, thoroughly trained professors in the laboratory branches who shall devote their entire time to the college in instruction or research. The catalogue of the Chicago College of Osteopathy shows that they have only three men of professorial rank as full time instructors in basic sciences."

The evidence shows that at the time of the inspection and at the time of the hearing, plaintiff had seven full-time instructors of professorial rank.

The fourth ground for denying plaintiff's application reads as follows:

> "4. The Chicago College of Osteopathy also fails to comply with Section 5(b) of the Department rules which is quoted below, since its catalogue shows the names of only two licensed physicians and surgeons as members of the faculty:
>
> " 'The faculty should be composed of graduates of institutions recognized as reputable medical colleges who have had training in all departments of medicine. Non-medical men should be selected as teachers in medical colleges, only under exceptional circumstancs, and only when medical men of equal special capacity are not available. The faculty should be organized, each department having as its head professor a physician and surgeon who shall be licensed to practice medicine in all of its branches in the state in which the medical college is located, and who shall have practiced his profession at least 10 years, and has devoted the five years next preceding such engagement

> to the exclusive practice of the specialty in which he is proficient, its associate professor, assistant professor, instructor, etc., each having his particular subjects for the teaching of which he is responsible to the head of the department.'"

The evidence shows that the head of plaintiff's Department of Surgery is fully qualified under the rule. He has 19 men of professorial rank under him who teach the subject, some of whom are located at the Detroit Osteopathic Hospital. Fourteen of these men are licensed by the State in which they teach to practice medicine in all its branches and all the instructors are trained in all branches of medicine and surgery.

The head of the Department of Medicine is a graduate of plaintiff's college and holds licenses to practice medicine in all its branches in the States of California, Florida, Michigan and Missouri. He is assisted by 22 men of professorial rank. Five of these teach in the Detroit hospital and have an unlimited license in the State of Michigan. Nine of the instructors in Illinois hold an unlimited license in other states but none has an unlimited license in the State of Illinois. All the instructors are fully trained in all departments of medicine and have had more than the minimum of experience required by the rule in the practice of their profession and in teaching.

Plaintiff has four men of professorial rank in its Department of Obstetrics. Two of them are located at the college in Chicago and are licensed by the State of Illinois to practice obstetrics. The head of the department satisfies the rule of the Department in reference to the length of time he has practiced and the length of time that he has devoted to his specialty. The other two professors in this department are located at the Detroit Osteopathic Hospital and have an unlimited license to practice in the State of Michigan.

Two men teaching at plaintiff's college in Chicago have the degree of Doctor of Medicine and are licensed by the State of Illinois to practice medicine in all its branches. The plaintiff has endeavored to obtain as members of its teaching staff other men who hold the degree of Doctor of Medicine and who are licensed by the State of Illinois to practice medicine. Those so qualified have refused to accept an appointment to teach at the Chicago college because of the attitude of the Medical Associations toward the osteopathic profession.

There is no reason from an educational standpoint why a teacher at the Chicago College of Osteopathy should hold an Illinois license to practice medicine in all its branches except where the teacher actually performs surgical operations or prescribes drugs. A great part of medical teaching in the preclinical years is done by men who in many schools are not licensed and have no contact with the treatment of patients. In the clinical years the teaching of the practice of medicine, practice of surgery and the practice of obstetrics covers a wide field, consisting of ideology, diagnosis, pathology, prognosis, therapy and management, and it is only a part of the teaching and training in these subjects that is concerned with the actual prescription of drugs or the actual performance of surgical operations. The men who do these things at plaintiff's college are fully licensed. The same amount of time is spent at plaintiff's college in the actual surgical procedure or the actual writing of prescriptions as is spent in medical colleges and the same amount of time is given to all the other phases of teaching as is given in medical colleges.

A number of medical schools which grant the degree of Doctor of Medicine and are approved by the Department of Registration and Education have department heads who do not hold the degree of Doctor of Medicine and who are not licensed to practice medicine in all its branches in the state in which they teach. Included among these medical schools are Harvard University, Loyola University, Indiana University, University of Illinois and University of Wisconsin.

The fifth ground for denying plaintiff's application reads as follows:

> "5. The number of anatomy tables provided by the Chicago College of Osteopathy is inadequate for the number of students in the freshman class, since they have only 12 tables for 68 students. The usual practice followed by approved medical colleges is four students to one table."

The evidence shows that there is nothing in the rules specifying the number of tables for dissection. The requirement for an approved medical college is that each student must dissect the lateral half of a cadaver. It is impossible for any medical school in Chicago to comply with that requirement because the supply of cadavers is not sufficient. All medical schools in Chicago are allotted one cadaver to each four students, which means that two students dissect the lateral half of the human cadaver. The plaintiff received cadavers in the same ratio to the number of students as the medical colleges.

The sixth ground for denying plaintiff's application reads as follows:

> "6. Under Section 7, 'Clinical Resources,' the Department rules provide that the work of the student at all times shall be under the guidance of a competent instructor who shall hold a license to practice medicine and surgery in all its branches, and since there are only two physicians and surgeons on the faculty of the Chicago College of Osteopathy who are licensed in Illinois, it is impossible for them to supervise all students in the college."

The evidence shows that the clinical training in the college begins in the third year, at which time the students are in attendance at the outpatient department. They are assigned the same duties and are supervised in the same manner as in other medical schools. They spend during that year 570 hours in clinical instruction. The students in their senior year spend three months in the outpatient department. The clinical staff devotes its entire time to the care of patients in the clinic during that period. For another three months in the senior year these students are in the Chicago Osteopathic Hospital, during which their time is divided between the various sections. Senior students spend twelve weeks externship at the Detroit Osteopathic Hospital. All the instructors at the Detroit Osteopathic Hospital who teach students of the plaintiff are licensed to practice medicine without any limitation in the State of Michigan. Two of the instructors at plaintiff's college in Chicago are licensed to practice medicine in all its branches in the State of Illinois. Students of the college while studying in Chicago are under their guidance and supervision. Plaintiff showed the same reason for its inability to get instructors who hold a degree of Doctor of Medicine as it did under point 4. The professors who teach materia medica, therapeutics, surgery and theory and practice, are qualified teachers and the instruction at plaintiff's college compares favorably with the instruction given at Northwestern University Medical School. A record has been kept of graduates from plaintiff's college and, in the case of graduates for the years 1942-49, eighty-eight per cent have passed licensing examinations for a full license in states where they are permitted to take the examination.

We have set forth the record in this case in detail to show the complete background of plaintiff's efforts to obtain approval of its college and to ascertain if there has been discrimination against it. We are not called upon to decide whether the practice of osteopathy has a sound basis in medical theory. We cannot and do not have any opinion on that. The legislature has authorized the practice of osteopathy. The sole question before us is whether a school which teaches osteopathy may at the same time upon the same standards and same conditions as are applied to other schools, teach its students the practice of medicine and surgery and by the same standards have its graduates permitted to take the examination for the practice of medicine. That is the question which is here involved.

In 1924 our Supreme Court found that on the record before it, a defendant, an osteopath, was as well prepared by college and hospital training to practice surgery as are the physicians in the medical schools. *People v. Schaeffer*, 310 Ill. 574.

The record clearly shows that for schools granting a degree of Doctor of Medicine the Department sets a very liberal standard for the interpretation of its rules and as to the plaintiff the interpretation is very strict. In each instance, under the six specifications where it was found by the Department that plaintiff did not meet the minimal requirements, the record shows that the finding of the Department was against the undisputed evidence, that plaintiff's entrance requirements, method of education and staff organization were substantially the same as other leading medical schools of the country that had been approved by the Department. Where faculty members did not meet the requirement that they be graduates of reputable medical colleges, it was proved that the faculty members were licensed to practice medicine in all its branches in other states but had a degree of Doctor of Osteopathy which did not meet the requirement of the Department. Plaintiff proved that it endeavored to obtain men with the degree of Doctor of Medicine but that such men refused to accept appointment because of the attitude of the Medical Associations toward the osteopathic profession. Dr. Eric Oldberg, one of the outstanding leaders of the medical profession in this State, testified that plaintiff's teaching hospital was one of the best in Chicago and was run competently and efficiently. We conclude, therefore, on the basis of the record in this case, that plaintiff conducts a college for the teaching of all branches of medicine and maintains the same high standards as do medical colleges approved by the Department of Registration and Education.

Applying the law as announced in *People v. Witte, supra*, to the record before us, we are of the opinion that the plaintiff, when judged by the standards which the Department has applied to other medical schools, has substantially complied with the minimum requirements of the rules, and that the Department was unjust, arbitrary and discriminatory as to the plaintiff in the enforcement of the rules. It therefore violated the requirements of Section 20 of the Medical Practice Act.

The Department's reply to plaintiff's argument on discrimination has very little substance and cites no cases in support of its position. It suggests, however, that if there is any foundation in fact for plaintiff's complaint, the only remedy to which it is entitled is a writ of mandamus to compel the Department to enforce its rules without discrimination. To this the plaintiff has replied that the record shows that the Department has engaged in a practice of discrimination against plaintiff and that it accomplishes this result by adopting rules with which literal compliance is difficult; that it rigidly applies these rules to the plaintiff but, as to other medical schools, ignores the rules or grants a liberal interpretation. Plaintiff says that it is entitled to equal treatment under the law (sec. 20 Medical Practice Act and cases heretofore cited) and that the way this can be accomplished is for the courts to compare its standards of substantial compliance with the standards actually applied to the accredited schools by the Department. Mandamus affords no remedy because the Department would pursue its policy of discrimination and find a way either by new rules or by their interpretation to avoid equal treatment for the plaintiff. The history of the controversy as it is revealed by the record and as we have related it substantiates plaintiff's position.

Is there a principle of law under which a court can give plaintiff the relief which it seeks? The principle of uniformity and equality before the law was applied in tax cases at an early date. *Chicago & North Western Railway Co. v. Boone County*, 44 Ill. 240. This case involved the claim of taxpayers that they had been discriminated against in the valuation of their property and were entitled to relief even though their property had not been assessed more than its actual value. The court said at p. 243:

> "No warrant is given, if the law is not strictly observed in the case of individuals, and their property is not assessed at its actual value, that the property of a corporation situate

in the same county, shall be assessed at greater proportional value than that of individuals, even though the enhanced assessment is not on the actual cash value of the property of such corporation. The same rule which is applied to individuals, justice and the Constitution demand shall be applied to corporations."

Affirmative relief was granted to the plaintiff. In subsequent cases over the years, taxpayers, where they have shown deliberate or flagrant discrimination against themselves in the assessment of their property, have been granted similar relief. *People's Gas Light and Coke Co. v. Stuckart*, 286 Ill. 164, 173; *People v. Grand Trunk R.R. Co.*, 357 Ill. 493, 497; *People v. Gillespie*, 358 Ill. 40, 46; *People v. C., M., St. P. & P. R.R. Co.*, 381 Ill. 58, 62; *National-Ben Franklin Fire Ins. Co. v. Brenza*, 411 Ill. 337, 344.

It is our conclusion based on the record that with respect to schools which grant the degree of Doctor of Medicine the Department has considered as a substantial compliance with its rules the same or even a lower measure than that which it has applied to the plaintiff. We are of the opinion that this has been done with the intent to discriminate and that to deny plaintiff the relief sought would be to condone an evasion of the statute (sec. 20 Medical Practice Act) and of the decision of the Supreme Court (*People v. Witte, supra*). The plaintiff has substantially complied with the requirements in accordance with the standards which the Department has in practice applied, and the Department should approve its application.

The judgment of the trial court is reversed and this cause remanded with directions to refer the matter back to the Department of Registration and Education for the entry of an order approving plaintiff's application.

Judgment reversed and cause remanded with directions.

SCHWARTZ, P. J., concurs.
TUOHY, J., took no part.

THE STATE BOARD NUMBER OF THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

The annual State Board Number of *The Journal of the American Medical Association* (May 29, 1954) presents licensure statistics for the year 1953 prepared by the Council on Medical Education and Hospitals of the A.M.A. This year's report is the fifty-second annual compilation of information and statistics. The report presents statistics for all medical examining boards of the United States and its territories. Because doctors of osteopathy are licensed by medical examining boards in some states statistics are published pertaining to doctors of osteopathy as well as doctors of medicine.

During the year 1953 there were 14,434 licenses to practice medicine issued by medical examining boards, 6,565 by written examination and 7,869 by reciprocity. Six states issued 6,191 of these certificates: California (1,977), New York (1,348), Illinois (766), Ohio (799), Pennsylvania (666) and Texas (635). Nine medical licensing boards issued less than 50 licenses during the year.

Of the 7,525 applicants examined by medical licensing boards in 1953, 13 per cent failed. Following are the percentages of particular classifications listed as failing the examinations:

1. Graduates of unapproved medical schools in the U.S.	70.2%
2. Graduates of extinct medical schools	50.0%
3. Graduates of medical schools outside of U.S. and Canada	45.5%
4. Graduates of schools of osteopathy	13.4%
5. Graduates of approved medical schools in Canada	4.1%
6. Graduates of approved medical schools in U.S.	3.8%

The statistics applicable to osteopathic colleges were reported by the medical licensing boards of only Colorado, Connecticut, Delaware, Indiana, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Texas, and Wisconsin. No licenses were reported from other licensing boards on which doctors of medicine serve. They are Alabama, District of Columbia, Kentucky, Oregon, Rhode Island, South Dakota, Virginia, and Wyoming, all of which may license doctors of osteopathy. It could be predicted that inclusion of the statistics from a few of these boards which were not available would lower the 13.4 per cent rate of failure reported for doctors of osteopathy. The statistics do not indicate for osteopathic colleges, as they do for medical colleges, whether or not they apply to approved or unapproved colleges. Such a distinction would also alter the statistics.

The passing and failure rates of graduates of A.M.A. approved medical schools varied considerably in the published report. Nine approved medical schools had a failure rate of over 20.0 per cent and ten approved schools had a failure rate of between 10.0 per cent and 20.0 per cent. Only nine approved medical schools had no failures before licensing boards among their graduates.

There were 7,869 physicians licensed by medical licensing boards upon the basis of reciprocity or endorsement. Of this number 3,136 presented the certificate of the National Board of Medical Examiners. The certificate of the National Board of Medical Examiners is recognized in all states except Arkansas, Florida, Georgia, Indiana, Louisiana, Nebraska, North Carolina, Pennsylvania, South Carolina and Texas. The number of doctors of osteopathy licensed by reciprocity or endorsement in 1953 totalled 85. These licenses were issued during the year by fifteen of the eighteen medical licensing boards that the A.M.A. lists as issuing such certificates to doctors of osteopathy. The A.M.A. list includes Alabama, but not Kentucky or the composite surgical board of Pennsylvania.

The A.M.A. statistics indicate that 7,276 persons were added to the physician population of the United States and its territories during the year 1953. During the same year there were 3,421 deaths leaving a net increase of 3,855 physicians.

Of the 1,463 graduates of foreign medical schools examined in 1953 by 36 medical licensing boards 667 or 45.5 per cent failed. They represented some 175 different foreign medical schools and seven foreign licensing corporations. There are an estimated 550 foreign medical schools and of this number the A.M.A. states that fifty are of such quality that medical licensing boards would be justified in considering current and past graduates on the same basis as graduates of approved medical schools in the United States. Eighty-three of the 182 foreign schools and licensing corporations mentioned above had a failure rate of over 50.0 per cent and forty-one had a failure rate of over 14.0 per cent. It is interesting to note that the failure rate of graduates of foreign medical schools was 44.9 per cent in 1930 and 46.3 per cent in 1953. There were 685 foreign-trained physicians added to the physician population of the United States in the year 1953, and over a 4-year period (1950-1953) the total of new foreign physicians equaled 2,012.

The reports of the twenty-one boards of examiners in the basic sciences are also included in the State Board Number of the *Journal of the A.M.A.* These statistics indicate that 5,074 candidates were examined by the twenty-one boards in 1953, and of this number 24.0 per cent failed. Of the 385 doctors of osteopathy cited as taking the examinations 90 or 23.3 per cent failed, in contrast to 553 students and doctors of medicine or 14.7 per cent of the 3,620 who took basic science examinations. Basic science certificates by reciprocity, endorsement, exemption or waiver were granted to 1,580 doctors of medicine and 167 doctors of osteopathy. The accuracy of the basic science failure rates for both M.D.'s and D.O.'s is questionable because six of the basic science boards, those of Arizona, Colorado, Iowa, Michigan, Minnesota and Oklahoma, report the number of applicants passing their examinations, but either do not report the number failing or the nature of practice of those failing. Obviously, therefore, the report in this regard is incomplete. Doctors of osteopathy were listed as being examined by sixteen of the basic science boards, no applicants being listed for Alaska, District of Columbia, Nebraska, Oklahoma, and Tennessee. Reciprocity certificates in the basic sciences were granted to doctors of osteopathy by all basic science boards except those in Alaska, District of Columbia, Nebraska, Oklahoma, and Tennessee.

The State Board Number of *The Journal of the American Medical Association* is an annual presentation of value to persons interested in and concerned with the licensure of physicians. Because of legal restrictions placed upon boards and also certain policies adopted by some of them, the statistics and information are not complete or accurate. Nonetheless the publication is an important one and is a valuable source of information and statistics on all aspects and areas of the licensure of physicians.

Department of Public Relations

CHESTER D. SWOPE, D.O.
Chairman
Washington

OASI COVERAGE

Under a closed rule that prevented any amendments, the House, on June 1, passed and sent to the Senate the Social Security Act Amendments of 1954, H.R. 9366 (a revised version of H.R. 7199), providing for compulsory coverage under the Old-Age and Survivors Insurance system of all hitherto exempt professions, with one exception. According to the report of the House Ways and Means Committee, which handled the bill, only physicians who are medical doctors remain exempt.

The Administration had requested that coverage be extended to all the currently excluded professions, and on May 20, 1954, the Ways and Means Committee adopted a provision to that effect. On May 25, 1954, however, as a final act of the Committee prior to reporting the bill, the Committee reversed itself and decided that M.D.'s should be excluded.

At the July, 1950, convention the A.O.A. House of Delegates confirmed that "it is the established policy of the American Osteopathic Association that the profession not be included under the Old-Age and Survivors Insurance program." At the July, 1953, convention it was resolved that the House "endorses the participation of osteopathic physicians in the Federal Old-Age and Survivors Insurance benefits program, if elective." The 1950 resolution against compulsory coverage was not rescinded by the 1953 action for voluntary coverage.

The House Ways and Means Committee refused to seriously consider voluntary inclusion of individual members of any profession.

The Senate Finance Committee will hold hearings on the bill beginning June 24 and ending July 9.

UTILIZATION OF PHYSICIANS AND DENTISTS IN ENLISTED STATUS IN THE ARMED FORCES

Public Law No. 403, approved June 18, 1954, adds the following proviso to Section 4 of the Doctors Draft Law:

Provided, That any person heretofore or hereafter inducted or ordered to active duty under the authority of this Act who fails to qualify for, or to accept, a commission or whose commission is terminated may be utilized in his professional capacity in an enlisted grade or rank.

The following explanation is derived from the Report (House Report No. 1771) of the House Committee on Armed Services recommending passage of the bill (S. 3096, now Public Law No. 403):

The purpose of the proposed bill is to remove any question as to the authority of the armed services to retain and utilize in a professional capacity in an enlisted grade or rank any doctor heretofore or hereafter inducted or ordered to active duty under the doctors draft law.

The simple issue is whether the Congress wishes to enact legislation which will permit the use of physicians and dentists as enlisted personnel in their professional capacity in those cases in which the individual physician or dentist, for security reasons, fails to qualify for a commission, or disqualifies himself to continue on active duty as a commissioned officer.

The Congress enacted the doctors draft law in September of 1950 in order to provide medical and dental care for our Armed Forces after the outbreak of war in Korea. Physicians and dentists were required to register as special registrants under the doctors draft law since the normal draft up to age 26 could not possibly fill the need for physicians and dentists.

Section 4 of the act of September 9, 1950 (doctors draft law) as originally enacted provided in part that a physician or dentist recalled to active duty in the Armed Forces—"may, under regulations prescribed by the President, be promoted to such grade or rank as may be commensurate with his medical or dental education, experience, and ability."

The Supreme Court in *Orloff v. Willoughby* (345 U. S. 83), had construed this language as authorizing the Armed Forces to retain and utilize in a professional capacity in an enlisted grade or rank those persons who are inducted under the doctors draft law but who fail otherwise to meet the qualifications for a commission as an officer.

Section 4 as later amended by the Public Law 84, 83d Congress, now provides in part that a physician, dentist, or person in an allied specialist category who has been inducted or ordered to active duty—"shall, under regulations prescribed by the President, be appointed, reappointed, or promoted to such grade or rank as may be commensurate with his professional education, experience, or ability."

On February 9, 1954, and subsequent to the enactment of Public Law 84, 83d Congress, the United States Court of Appeals for the Fourth Circuit in the case of *Nelson* v. *Peckham* decided, in view of that amendment, that if a dentist inducted under the Doctors Draft Act be held not fit to be an officer, he should be held not fit for the services for which he has been drafted and should be dismissed.

Thus, the decision of the United States court of appeals would, if followed, prevent the Armed Forces from retaining and utilizing physicians, dentists, or persons in an allied specialist category in a professional capacity in enlisted grades. In order to retain such persons and utilize their services in a professional capacity, the Armed Forces would be required to commission and promote them to the level of their professional education, experience, and ability irrespective of the security aspects of their qualifications for commissioned rank. The bill is intended to prevent such a situation.

The proposed legislation, in the nature of an amendment to the doctors draft law, authorizes the military departments to use a physician or dentist in his professional capacity in an enlisted rank or grade if he fails to qualify for a commission. Likewise, if an individual physician or dentist refuses to accept a commission, he can be used in an enlisted grade or rank. Furthermore, if a physician or dentist is commissioned and is then found to be a security risk, his commission can be terminated and he can be continued on active duty as an enlisted man or discharged.

The Department of Defense witness, the Assistant Secretary of Defense for Manpower and Personnel, Dr. John Hannah, in his testimony stated as follows:

"Some concern has been expressed as to the language of S. 3096. It has been suggested that it is too broad wherein it states 'who fails to qualify for or to accept a commission or whose commission is terminated may be utilized in his professional capacity in an enlisted grade or rank.' It is feared by some that this would permit an arbitrary rejection of physicians and dentists and require loyal physicians and dentists to be forced into the draft and to serve in an enlisted grade or rank. Let me assure this committee that such fears are entirely unwarranted. As I have stated, the Department of Defense would much prefer that all of its physicians and dentists serve in an appropriate commissioned rank. I think that the proof of the firmness of this policy is adequately demonstrated by our experience under the doctors draft law.

Since this law was enacted on September 9, 1950, 24,721 physicians and dentists have been taken into the Armed Forces pursuant to the doctors draft law. Out of this total, 65 have been taken in in an enlisted status. Forty-six of these were not commissioned originally becauses they refused to accept or failed to apply for a commission. Forty-one of these have been commissioned, 3 were separated for physical conditions which developed, and 2 still refused to accept the commission. The remaining 19 were not commissioned because of their failure to meet security requirements. In other words, Mr. Chairman, out of 24,721 physicians and dentists brought into the service through the doctors draft law, only 19 have actually been denied commissions and were required to serve in an enlisted capacity, and every one of these were regarded as security risks.

This is the record of our experience to date under the Doctors Draft Act which (until the decision in the Nelson case) was construed as permitting the Department of Defense to do precisely what we will be permitted to do under S. 3096 if enacted into law. I can state unqualifiedly for the Secretary of Defense that this policy will be continued in the future and that every physician and dentist who is qualified will be offered a commission commensurate with his professional experience unless he is found unsuitable for security reasons or he himself rejects the tender of a commission."

Thus, the Committee on Armed Services unanimously recommends enactment of the proposed legislation for it will prevent an individual physician or dentist from escaping military service by merely claiming the privilege of the fifth amendment. Obviously, the armed services will not commission an individual who refuses to answer questions concerning his loyalty, but there is no reason why this individual who, having chosen not to answer these questions, should not, nevertheless, be required to serve, as thousands of loyal physicians and dentists have served, and are now serving. If upon investigation the physician or dentist is found to be a Communist, or is a dangerous security risk, then he may be administratively discharged as undesirable.

Current Medical Literature

NEW METHOD OF PELVIC TRACTION FOR THE RELIEF OF LOW-BACK PAIN

A traction method that is claimed to do everything expected of leg traction more efficiently and with more certain results than those in present use is described by Samuel Varco, M.D., in *Surgery, Gynecology and Obstetrics,* June, 1954. It can be applied in injuries involving the lower half of the back, some pelvic fractures, some fractures of the lumbar vertebrae, and in any case in which relaxation and decompression of tissues is hoped for.

A special pelvic belt is used which has strips of webbing coming down each side to a spreader. The belt, which is individually fitted to each patient, should have a soft, pliable portion to cup over the iliac crests and properly placed slip buckles. Two strips of 1 inch, nonelastic webbing 5 feet long, 2 strips of 1 inch nonelastic webbing 3 feet long, and a single wooden spreader foot bar with slots at each end to receive the webbing and with a hole in the center in which to insert the sash cord weights are also required.

After the belt is placed around the patient's waist and pelvis, the 5-foot strips of webbing are placed through the slip buckles on each side from anterior to posterior and through the Dee rings of the 3-foot webbing so the apex will come at knee level. The 3-foot strips are continued to the single spreader, the entire strip adjustment being in the shape of a Y. After both sides are adjusted to be equal in length, the desired amount of weight is applied through the center of the spreader. The pulley and weights are suspended over the foot of the bed in the usual way.

The device used in pelvic traction is easy to apply; the patient is comfortable, and, since his legs can move freely, he is cooperative. Nursing care is easier, and none of the complications of leg traction, such as swelling of the knee or ankle, redness, and adhesive plaster rash, have been observed.

Pelvic traction exerted on the iliac crest is felt by the patient at the sacroiliac joint and along the spine. This traction is direct because of the relationship of the sacroiliac joints, lower vertebrae, muscles, and pelvic ligaments.

Over 200 patients with low-back injuries, including slipped disks, pelvic fractures, and fractures of the lumbar vertebrae, have been treated with this method. Improvement was claimed by approximately 90 per cent. Pain disappeared within a few hours in many cases, and a very high percentage of severely injured patients were able to resume work in from 3 to 4 weeks.

EIGHT FATAL ANAPHYLACTIC REACTIONS TO PENICILLIN

In an investigation of causes of sudden deaths which was conducted by the Office of the Chief Medical Examiner of the City of New York, eight deaths were found to have occurred after the injection of penicillin. These cases were reviewed by Abraham Rosenthal, M.D., in the *New York State Journal of Medicine,* May 15, 1954.

Autopsies were performed in all but two of the cases, tissues were examined microscopically, and a search was made at the injection site to determine if any penicillin had entered the bloodstream. In no case had a vessel been penetrated. Reaction and death occurred within a few minutes in all eight patients. At least one patient had never had penicillin prior to the fatal injection, and at least three had not shown any previous reaction to it. Six of the patients developed severe respiratory distress following administration, and two went into profound shock. In every autopsy, intense visceral congestion was revealed; in most cases it was most severe in the lungs.

A review of the types of penicillin used in these cases and in other fatal and nonfatal reactions resulted in the conclusion that penicillin per se was the sensitizing agent and it, rather than one type of penicillin or the procaine radical incorporated in the penicillin, was the agent responsible for subsequent reactions. Sensitization may result even from oral administration.

The shocking number of reports of fatal and near fatal reactions to penicillin and the rapidity with which they are increasing (these eight cases occurred in about 2 years) are evidence that penicillin is being administered indiscriminately. The conclusion is reached that parenteral use of penicillin should not be undertaken without first having questioned the patient or his family about any previous administration of penicillin and its after-effects and about any history of allergy. The word "reaction" may not have sufficient meaning to the patient or his family; therefore, he should be asked if he has ever experienced an eruption, rash, swollen joints, shortness of breath, or skin blotching following penicillin administration. Even a suggestive positive answer to these questions should contraindicate any form of penicillin administration. In addition, the presence of asthmatic symptoms at the time of administration should also contraindicate its use. (Asthmatic symptoms were present at the time of injection in one of the cases described.)

The author disagrees with those who believe that a skin test should be performed on those patients for whom there is a lapse of a few days between administrations. He believes that at the slightest suspicion of sensitivity penicillin should be omitted and another antibiotic substituted, that a skin test is advisable only if there is positive bacteriologic laboratory proof that the organism is sensitive only to penicillin. In addition, use of penicillin should be restricted to those instances in which it is absolutely necessary.

CHRONIC DIARRHEAS
DIAGNOSIS AND MEDICAL MANAGEMENT

In his attempt to determine the etiology and medical management of chronic diarrheas, L. L. Hardt, M.D., has divided them into seven different categories. These various classifications are discussed in *The American Journal of Proctology,* June, 1954.

Under the heading of physiologic disturbances are listed the diarrheas of achlorhydria, gastric surgery, pancreatic insufficiency, fatty diarrheas from diseases of the absorptive system—nontropical sprue, and endocrine diseases—hyperthyroidism, Addison's disease, and parathyroid disease.

Diarrhea of achlorhydria may occur in a severe or mild form and may be either continuous or intermittent. Vague abdominal symptoms and anorexia are usual. Stools frequently are foul smelling and light in color and may contain mucus. Roentgenologic examinations of the gastrointestinal tract and stool examinations for parasites and tubercle bacilli are negative. Dilute hydrochloric acid, 15 to 30 drops in a glass of water, should be sipped through a glass tube at meals. In addition, a bland, vitamin-rich diet, supplemented with liver extract and iron, is recommended.

Diarrhea often results from the dumping syndrome which frequently follows radical and subtotal gastrectomies and gastroenterostomies. Treatment consists of adding hydrochloric acid, pepsin, pancreatin, vitamins, and bile salts in concentrated form to the diet. The diet should be of the nonirritating, low residue, low fat type and should contain moderate quantities of proteins, carbohydrates, and minerals. Meals should be small and frequent.

Diagnosis of diarrhea of pancreatic insufficiency is made by careful examination of the stools. Large amounts of undigested fat, protein, and carbohydrate elements are present, but pancreatic ferment tests may be negative. Stools are frequent, semiliquid or watery. Large doses of pancreatic extracts and a low fat, vitamin-supplemented diet should be prescribed.

Excess fat in the feces is a diagnostic requisite in nontropical sprue. Its presence, the clinical symptoms, objective findings in the gastrointestinal tract, and hematologic values form the basis for diagnosis. A high protein, low fat diet is of primary importance in treatment of nontropical sprue. Bed rest is also necessary. Calcium, vitamins K, A, D, B_1 and

nicotinamide should be administered in large doses. Existing clinical symptoms should also be treated.

Of the diarrheas of endocrine disturbances, that of hyperthyroidism may be characterized by as many as fifteen or twenty or as few as one to three stools a day. Diagnosis is based on the basal metabolic rate and presence of alimentary hyperglycemia. Physical and mental rest are necessary; a high calorie, well-balanced diet, Lugol's solution or propylthiouracil, and thyroidectomy compose therapy. In Addison's disease treatment consists of replacing the deficiency of "mineral" cortical hormone with desoxycorticosterone acetate (DCA). In parathyroid disease diarrhea occurs as part of the symptom complex of tetany. Dihydrotachysterol, 15 minims daily, should be administered for 30 days, followed by a rest period of 2 to 4 weeks before further medication.

Diarrheas of parasitic infections are classified into amebic dysentery and those due to Giardia lamblia and Trichomonas hominis. In all three diagnosis rests on identification of the parasite in the feces or in proctologic specimens. Amebiasis is treated with emetine hydrochloride, 1-grain or 0.06-gram intramuscular doses twice a day for 3 days, repeating after a week's rest in a critically ill patient. Carbarsone, a 0.25-gram capsule 3 times a day after meals for 1 week or 1 capsule twice a day for 10 days, may be given after emetine therapy or in conjunction with it. Diodoquin, 10 grains three times a day, is given for 3 weeks following combined emetine and carbarsone therapy. If carbarsone is not tolerated or if amebic cysts still exist after two full courses of emetine, carbarsone, and Diodoquin therapy, or in a relapse, Vioform is administered in the same dosage as carbarsone. Sulfadiazine, 1 gram every 4 to 6 hours, is the drug of choice and should be continued for at least 10 days. Dietary, vitamin, and supportive therapy is often necessary for management of malnutrition. In Giardia lamblia infections, a high protein diet and Atabrine, 1.5 grains three times a day for 5 days, is recommended. Diodoquin tablets, 3.2 grains, one, two, or three times daily for 2 weeks, or 7.5 grains of Acranil three times a day for 4 to 5 days have also been successful. There is no known drug that will eliminate Trichomonas hominis.

In tuberculous ileocolitis severe diarrhea is treated with intravenous or intramuscular administration of large doses of synthetic vitamins. If pain is severe and diarrhea uncontrollable, opiates must be used. Streptomycin, paraminosalicylic acid, and isoniazid are extremely valuable. The diet should be low in residue but high in calories, vitamins and minerals.

There is rarely any doubt of diagnosis when diarrhea occurs in idiopathic ulcerative colitis. Prolonged rest and occupational therapy are prescribed. Dietary management is also included, and sulfonamide and antibiotic therapy have been found effective.

Diarrhea of allergic origin is diagnosed by eliminating the possibility of any organic disorders. The ideal therapy is elimination of the allergen, and epinephrine or ephedrine administration for symptomatic relief in the acute stages.

Diagnosis of functional diarrhea of a nervous or psychogen origin should be considered only if all tests for other causes have proved negative. However, there may be a functional aspect to any form of diarrhea. Treatment is with antispasmodics, sedatives, and psychotherapy.

CORTISONE IN THE IMMEDIATE THERAPY OF APOPLECTIC STROKE

Although rapid and nearly complete recovery may occur with only symptomatic treatment following a cerebrovascular accident, the frequency with which prompt and striking improvement in neurologic symptoms occurred in patients with cerebral thrombosis or embolism during cortisone treatment is regarded by Henry I. Russek, M.D., Burton L. Zohman, M.D., and Allen S. Russek, M.D, as more than coincidence They describe the results of cortisone therapy in fifteen cases of cerebrovascular accident in the *Journal of the American Geriatrics Society*, April, 1954.

There were 12 male and 3 female patients in the series; their ages ranged from 42 to 74 years, the mean age being 60.8 years. Eleven of the patients suffered from hypertension, and there was a history of angina pectoris in 5 and of previous myocardial infarction in 4. Cerebrovascular occlusion was due to thrombosis in 9, to embolism in 3, and to hemorrhage in 3. Blood was present in the spinal fluid of the 3 patients with hemorrhage. Two of the patients with embolism were convalescing from acute myocardial infarction, and one patient in whom embolism occurred suffered from rheumatic heart disease and chronic auricular fibrillation. Six patients in the series had had previous attacks of congestive heart failure, 3 had diabetes mellitus of mild to moderate severity, 3 (with cerebral hemorrhage) were comatose when treatment was begun. In 6 other patients signs and symptoms were also severe; mild signs and symptoms were present in only 3. Marked right hemiparesis, conjugate deviation of the eyes, and varying degrees of clouded consciousness were present in 6 patients. There was marked facial weakness, aphasia or dysarthria, and swallowing difficulty in several of the latter. Mild left hemiparesis was present in 3 patients.

For most patients 300 mg. of cortisone were administered orally in divided doses on each of the first 2 days; the dose was progressively diminished to a maintenance dose of 50 mg. daily through the third week. The course of cortisone was intentionally discontinued at the end of the first week in 3 patients but was resumed after several days in 2 of them. Cortisone administration was parenteral in patients in a coma or with swallowing difficulties. When possible, each patient received a low salt diet with oral administration of 3 grams of potassium chloride daily in divided doses. Serial electrocardiographic recordings were made, and serial observations were made of hemograms and urinalyses. Blood pressure and heart rate were determined daily. Cortisone administration was begun within 48 hours after the cerebrovascular accident; it was started within 24 hours after appearance of symptoms in 6 patients. In 2 patients with cerebral embolism and 1 with cerebral thrombosis cortisone was administered after stellate ganglion block was ineffective.

In the 3 cases of cerebral hemorrhage, cortisone did not have any demonstrable beneficial effect. All 3 patients had been moribund at the time treatment was started; coma deepened, and they died within 2 to 5 days.

Of the 12 patients with cerebral thrombosis or embolism, dramatic clinical improvement took place in 9 within 24 hours after cortisone therapy was instituted. Paralytic signs and symptoms showed striking amelioration, and beneficial mental, emotional, sensory, and psychomotor changes occurred. Apparently rapid clearance of conjugate deviation of the eyes, incoherent speech, dysarthria, and aphasia took place. In 9 patients who were somnolent, stuporous, mentally depressed, or apathetic, an overnight change occurred, and they became keenly alert and interested in their personal progress. The degree of paralysis of affected extremities subsided significantly, and after 1 or 2 days of therapy, active rehabilitation measures were easily begun. In all cases, the greatest clinical improvement took place within 24 to 48 hours after cortisone therapy was instituted, but a definite although gradual return of function continued.

In 2 of the 3 patients in whom cortisone was discontinued, paralysis of extremities increased after 2 and 3 days. Readministration of the drug resulted in improvement in motor power of the affected extremities. This rebound was not seen at termination of treatment in any of those who received cortisone continuously for 3 weeks. Four patients were walking unaided or with a cane after 3 days of therapy; at the end of a week, 4 more were ambulant; and 2 were ambulant after 10 days. Because of coexistent acute myocardial infarction, 2 patients were intentionally confined to bed, but there was no doubt that the psychologic state of the patient and improvement of function in the involved leg would have permitted early ambulation. At the end of treatment, remarkable neurologic recovery had taken place in all patients. Mild to moderate weakness in the hand grip, lower facial paresis, and minor speech and swallowing difficulties were the only remaining effects. Severe monoplegia of an arm continued in 1 patient. There were no serious difficulties in this study from the use of cortisone.

Book Notices

MANUAL OF JOINT MANIPULATION. Prepared by Byron E. Laycock, D.O.; Professor of Osteopathic Principles and Practice, Des Moines Still College of Osteopathy and Surgery. Cloth. Pp. 437. Price $7.00. 720-722 Sixth Ave., Des Moines, Iowa, 1953.

"What is a manipulative treatment?" This question has most often occurred to individuals unacquainted with the distinctive therapeutic procedures of osteopathic physicians. Other individuals who have had manipulative treatment have considered it the whole armamentarium of their doctor. As a result, many patients and some doctors have confused a system of practice and its distinctive therapy as being one and the same thing, thus mistakenly equating a therapeutic procedure with osteopathy, and inadvertently paying a tribute to the effectiveness of skilled manipulative care. It is still occasionally necessary for an osteopathic physician to explain to his patient that osteopathy and osteopathic medicine *are* synonymous, and that old-school and osteopathic medicine are each independent and unlimited systems of practice. He will emphasize that an "osteopathic treatment" is a manipulative procedure applied remedially by a doctor of osteopathy either to a specific condition, or as a basic method of controlling the disease process itself. Yet, such an explanation too often leaves the initial question, "What is a manipulative treatment?" unanswered in the questioner's mind. And in this period of our profession's history the query is arising with increasing frequency from varying sources.

Prerequisite to a definition of this distinctive modality is a reiteration of the broadest characteristic of osteopathic medicine, its particular approach to the problems of health and disease. The breadth and depth of meaning of the somatic component of the disease process, the fundamental and distinctive principle of osteopathy, have not yet been sounded. The unitary concept of a disease process underlying diseases has a significance not yet appreciated within our own group; its tremendous import to medicine generally is almost totally unrecognized. The reader who expects to secure a grasp of the osteopathic concept or an understanding or appreciation of its principles through either a perusal or a study of a book on technic will not only be disappointed, he will much more likely be widely misled.

A definition of manipulative technics should be sufficiently inclusive to meet the approval of osteopathic physicians generally. It should reflect the accuracy of the trained investigator. By indirection such a definition will show forth the limitations that dog any text on manipulation, no matter how excellently conceived or brilliantly executed the volume may be. An acceptable definition will assist authors of manuals on manipulation to delimit the scope of their work, and forewarn their critics not to expect the impossible. It will restate a distinct phase of osteopathic therapy in today's concepts and so aid the doctor in furnishing precise answers to interested and intelligent laymen's query: "What is a manipulative treatment?" The experienced osteopathic physician will not repeat any definition in a parrot-like manner, but interpretatively. Thereby he can do much to clear up the miasma which has so long surrounded the procedure, "a manipulative treatment."

There is no better way to define "manipulative treatment" than to describe its why, what, and how in the language of a nonosteopathic scientist, that is, a professional scientist who does not possess the D.O. degree. It is necessary, however, that this scientist be intimately acquainted with the relational aspects of the role of manipulation in theory. Invariably he will possess the objectivity of the trained researcher, understanding the manipulative modality as an outgrowth of the philosophy, art, and science of osteopathy. One such scientist has called attention to

> . . . the fact that the musculoskeletal system participates in virtually every disease process—and because it is accessible to the physician's hands and responsive to appropriate treatment—the musculoskeletal component of the disease process is the logical one through which to influence the disease process itself.

And he adds:

> . . . There is not now, nor in the foreseeable future, any systematic approach to the somatic component of disease, other than osteopathic manipulative treatment.

Thereupon, he defines osteopathic manipulation as

> . . . the art and science of detecting, evaluating and then reducing with precisely applied manual forces and other physical means, the subtle abnormalities in structure, tension, motion and position of the skeletal, muscular and ligamentous tissues, which are associated with osteopathic lesions of various locations, origins and types. The reduction of the abnormalities and stresses in these, the somatic tissues, reduces their disturbance and irritation of other tissues—and, therefore, in the body as a whole. The skill—the art and science—of osteopathic manipulation is based on intimate, detailed knowledge of the structure, function, responses and inter-relationships of all the tissues involved and of the many factors in and around the patient contributing to their disturbance.

The scope of this definition precludes the possibility of an encompassing, definitive manual of manipulation in any one text or series of texts. So defined, manipulation emerges as a modality grounded in a premise (the musculoskeletal component of the disease process) which interrelates it to the known facts of physiology and pathology and subjects it to development by continuing scientific investigation. As a matter of fact, no definitive claim has ever been made for any text on osteopathic technic, and relatively few books on manipulation have been written. If the knowledge of the artistry and skill required in manipulation were transmissible by the written or spoken word, then it would be possible in like manner to produce great violinists, pianists, artists, and sculptors, and, more nearly to the point, great surgeons.

There are manuals available on surgical technics, but either surgical or manipulative technics so described become static procedures giving little hint of the vital processes inherent in any creative achievement. Technic presentation within the confines of a text necessarily becomes dogmatic, mechanistic—in the philosophic sense, and quite inadequate to meet the need which such a presentation attempts.

Manuals of manipulative technics have a common characteristic which leads to a fault which they all exhibit. To a high degree they are made up of pictures or diagrams that serve primarily as a reminder of the peculiar technical skills of their author—skills that lose their vitality when embodied in the pages of a book. Since it is scarcely possible for the informed to acquire new technical methods of manipulation from the pages of a book, the neophyte will find such a book useless or misleading.

Authors of manuals of manipulative technics invariably have been the mentors of selected groups of students who have come within their orbits, directly or indirectly. To these students such manuals are of special interest and usefulness; to the undergraduate they have value for methods currently under study; and to former students they serve to review the methodology of their teacher and subject it to the pragmatic acids of experience, thereby enabling them to revise and enrich their own skills. Limited as are such texts, they can be justified on just such bases as are suggested in this paragraph. But the author and the reviewer should be realistic, on the one hand, not attempting the impossible and, on the other, not expecting it. Both will recall a point that has often been made: Andrew Taylor Still, prolific writer that he was for his day, produced no technic manual. The fact remains that it has not yet been possible to produce a teaching manual of manipulation that carries anything like the same precision found in the better texts on surgical technic, limited in value as these are. There have been useful attempts made to produce such manuals on manipulation, and they might well continue to be made if their authors maintain a realistic approach. Aside from personal instruction, however, audiovisual material professionally produced seems to offer the only hope for really useful instruction in manipulation. Perhaps as audiovisual methods gain in proficiency, they will, in turn, suggest more efficient methods of transmitting instructions to the printed page.

Such are the inevitable limitations within which Dr. Laycock was forced to work, limitations entirely aside from the problems of publication and the restraints imposed by budgets. The author has wisely restricted his exposition of manipula-

tive technics to those involving joints, classifying the joint areas into those of the foot, knee, hip joint, spine (sacroiliac, lumbar, thoracic, cervical), shoulder girdle, and upper extremity. For the methods he outlines he makes no special claim other than that he has found them to be useful. A reviewer allopathically grounded, knowing nothing of the fundamentals of osteopathic medicine and unacquainted with the difficulties inherent in the production of such a text, would find this volume of little moment and generalizing therefrom be moved to judge osteopathy accordingly.

There are minor points of criticism of this particular book which can be justly made, not to carp, not because they are peculiar to this manual, but because they are true, and have been true in measure of practically every osteopathic text. We have yet to achieve a professional maturity sufficient to enable us to produce a volume that will meet all the canons imposed upon getting ideas and words into type and then into a book. It is not a question of individual ability, for modern bookmaking is a consultative art, technical in nature and involving many people highly experienced in many different skills.

As a profession we have yet to achieve sufficiently broad cooperative efforts in many areas of our activity. Perhaps this weakness is more evident in the field of authorship than in any other in osteopathic circles; in other areas our progress has been remarkable. Here, as elsewhere, we will learn only by a frank admission of our deficiencies and a willingness to approach their correction by a concerted effort of individuals and organizations. The most hopeful sign of our beginning professional maturation is a growing recognition that these deficiencies cannot be corrected without frank criticism from within our ranks of each other and by each other.

The problem of a reasonably uniform nomenclature as applied to the physiologic movements of the spine is one still unsolved, but a primary and fundamental one which cannot and should not be disregarded. The author has not used the descriptive lesion terminology of the American Association of Osteopathic Colleges or that of the Academy of Applied Osteopathy. Granted that he chose not to do so for reasons good and sufficient to him, he should have given recognition to the semiofficial terminology that we do possess, if only to translate, insofar as possible, his particular nomenclature into those terms.

The author makes occasional statements as facts without supporting references, statements which are interpretations by the author of data not necessarily acceptable to all of his readers, for example, the statement on page 82 on "leg length differences." Other such instances could be cited only to point out the necessity for maintaining meticulous standards of editing.

Then there is the tremendous problem of the actual manufacture of printed matter, the physical form and rules that must be followed if the sensitivities of trained readers are not to be offended. The problems of typography and illustration and of printing style are without number, and they must be solved by the author, an editor, and the publisher, all working closely together. Bookmaking was always a fine art; mass production has also made it a conforming art in which the demarcation between a highly professional production and an amateur effort is an ironclad adherence to acceptable usage and practice. In a manual of manipulative technic in which the material is presented chiefly by photographs the problem, from proper posing to acceptable reproduction by modern standards, is a tremendous one, with resulting costs that may be prohibitive in a book destined to a limited circulation. Or does our failure professionally to insist upon these standards in itself limit our circulation? The reviewer, concerned as he is with constant publication of periodicals, and with a supervisory responsibility for the publication of an informing literature for lay people, is aware of every ramification of the problem, compounded as it is by the intricacies of book production. Yet he insists that the time has come in the organizational life of osteopathy when every author, every organization, and all groups professionally related need to admit deficiencies honestly and seek to remedy them at every level.

Our professional claims are all-enveloping. At every hand we must close ranks to validate these claims. And that does not mean we are to leave off trying. He who reads a note of discouragement or negative criticism into this critique reads it wrongly.

A volume such as this should represent to all of us another aspect of our phase of challenge. Its faults and weaknesses are not those of its author; they are those of the osteopathic profession. This manual, therefore, should be widely read, for there is much for the profession, taken individually and collectively, to learn from it. To the author it represents culminating effort of a professional life devoted to a particular and distinctive facility which he ably exemplifies. Genuine recognition of his contribution to osteopathy as represented in this text, however, will come to the degree that he is accorded an honest appraisal by many readers, who having read the book will write him exactly as they would have done had they been given an opportunity to see it in manuscript: to point out excellencies where they are seen; to be sharply critical where they can support such criticism on grounds other than their own "pet" theories; to confirm by acceptable data or to reject upon the same basis; and to be definite, factually definite. We have many doctors of osteopathy who are capable of doing just this thing, and it is their duty to so do; thereby they will not only encourage and reward the author, they will repay their profession a debt. In the measure that knowledge has been given to men, in that measure are they obligated to its return.

THE GOLD-HEADED CANE. By William Macmichael, M.D. Cloth. Pp. 186, with illustrations. Price $6.50. Charles C Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill., 1953.

The growing number of medical bibliophiles among osteopathic physicians will be greatly interested in the recent publication of the seventh edition of William Macmichael's "The Gold-Headed Cane" (first edition, 1827, London). For this tribe, Charles C Thomas has brought forth a highly desirable volume. Everything about it is proper to the book's intent. The type face, the paper, the binding cloth, the gold imprinting upon the black backstrip, the illustrations from the original woodcuts, and, of course, the uncut edges—all contribute to make it a volume for the lover of perfectly made books.

In 1827 when William Macmichael wrote the story of the "Gold-Headed Cane," the era the Cane symbolized had come to an end. This was the era of the fashionable English physician who went to his sick calls dressed in a silk coat, breeches and stockings, buckled shoes, lace ruffles, full-bottomed wig, and a gold-headed cane, and driving in a coach and pair. Typical of this class of physicians was John Radcliffe (1650-1729), physician to King William and Queen Mary.

For 150 years Radcliffe's gold-headed cane passed in succession through the hands of some of the most successful practitioners of England. It finally came into the possession of Matthew Baillie (1761-1823), among the first of the physicians of a new day in which science was rendering obsolete the pompous air of fashionable doctors of the earlier era. Baillie himself discontinued carrying the gold-headed cane on his sick calls, no longer considering it as a necessary appendage of his profession. After his death his wife found the cane in a corner of the consulting room and presented it in 1825 to the Hall of the Royal Academy of Physicians. There it reposes today.

In 1827 William Macmichael (1784-1839), physician to the King, first wrote the autobiography of the Gold-Headed Cane, of which this text is the seventh edition.

The Preface of this new edition is by William J. Kerr, M.D., professor of medicine, University of California, who resumed the Gold-Headed Cane symbolically in 1939, for that was the year of the first award of the Gold-Headed Cane of the University of California School of Medicine, to that senior medical student who, during his entire clinical experience, showed the greatest interest in the welfare of his patients.

To the thoughtful and scholarly physician this volume will have strong appeal, and once in his possession it is destined to be treasured.

In "The Gold-Headed Cane" are combined many appeals: medical history impregnated with gentle irony; medical tradi-

(Continued on page 666)